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March
1943

Conservation of Strategic Non-Ferrous Metals

PRIOR to our entrance into this war, it was already noticeable that a shortage of copper, tin and zinc was in the offing. How much of these strategic materials was to be available for the Non-Ferrous casting industry could not then be determined, but at the present time, there is practically no virgin copper and very little tin and zinc available for castings.

Steps were immediately taken to de-grade the various brass and bronze alloys by substituting emergency specifications which would require little, if any, virgin metals.

In spite of the fact that a considerable number of alloy changes were effected, there are still plenty of Government and other technical society specifications remaining that could and should be converted into emergency specifications, using brass and bronze ingots manufactured from available scrap with additions of little, if any, virgin copper, tin and zinc.

The Non-Ferrous foundryman who is making castings requiring any quantity of strategic metals such as virgin copper, tin, etc., must be more on the alert than ever.

There are still many Non-Ferrous foundrymen who have had little or no previous experience in casting certain alloys drastically affected by shortages of these critical materials. To assist them, A.F.A. now is preparing, through its Brass and Bronze Division, a series of recommended practices for casting these alloys for the war effort.

Don't be smug and complacent if you are making restrictive alloys. Explain to your customers the difficulty which may be encountered in obtaining these alloys (Navy G, silicon bronzes, etc.). The matter should then be taken up with the Government agencies through whom the contracts were originally let. In general, they will cooperate. In this way you may avoid having plastics and other materials substituted for brass and bronze castings.

Just one more thought. Keep whatever brass scrap or refuse you intend selling, well sorted. It will be much more valuable and you will contribute considerably to the conservation effort if you will avoid contamination with aluminum scrap, silicon bronze scrap, aluminum bronze scrap and similar materials.

Wm Romanoff

WM. ROMANOFF, Chairman,
A.F.A. Brass and Bronze Division

WM. ROMANOFF, Vice-President of H. Kramer & Co., Chicago, has been an active worker in non-ferrous activities of A.F.A. for many years. Chairman of the Brass and Bronze Division, he also serves on the Association's War Activities Committee and the Technical Activities Correlation Committee. He has contributed a number of papers on brass foundry practice to A.F.A. meetings. A graduate of the University of Michigan, he was associated with the Ohio Brass Co., Mansfield, Ohio, as metallurgist for nearly six years, and has been connected with H. Kramer & Co. for over 15 years.

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Papers at Streamlined Foundry Congress Will Aid Castings Technique in War Work

THE three eventful days of the 2nd War Production Foundry Congress, at St. Louis, April 28-30, will provide an intensive series of papers and discussions on many special castings production problems related directly to the war effort, as well as to developments in castings production and metallurgical fields.

Association headquarters will be established and meetings will center around Hotel Jefferson, where A.F.A. President D. P. Forbes, Gunite Foundries Corp., Rockford, Ill., will preside at the opening meeting on Wednesday morning, April 28.

Outstanding Speakers

While four special sessions will feature speakers of national prominence in business and industry, the remaining time of the Congress will be given over to group discussions and the presentation of technical and practical papers covering all branches of sand castings. Magnesium, gray cast iron, aluminum, steel, brass, malleable cast iron and bronze . . . all will be fully dealt with. Pattern-making methods, foundry cost methods, sand research, safety and hygiene, foreman training, apprentice training and refractories will be discussed in their relation to the war efforts of the foundry industry.

As tentatively planned to date, the Pattern Division, Aluminum and Magnesium Division, and Malleable Division all will hold their sessions on the first and second days of the Congress. The Steel Division and Brass and Bronze Division sessions are to be concentrated on the second and third days, and the Gray Iron Division and General Interest sessions are scheduled for all three days.

To Hold Evening Meetings

Because of the need for conserving the time of those attending, evening meetings will be held this year. These meetings will be given over largely to the shop practice courses, thereby providing an opportunity for the many shop men of the important St. Louis foundry district to participate. Heavy local attendance is anticipated.

Aluminum and Magnesium

The Aluminum and Magnesium Division of A.F.A., under the chairmanship of Dr. N. E. Woldman, Eclipse Aviation Division of Bendix Aviation Corp., will sponsor a technical session and a round-table discussion, with a shop course session on Sand Control Practices. Subjects of papers lined up for the technical session include the following:

Recommended Practices for Magnesium Foundry Alloys.

Recommended Practices for Aluminum Foundry Alloys.

Chemical Analyses of Sands for Magnesium Castings.

Thermal Gradients in Molds and Cores for Magnesium Alloys.

Recent Production Improvements in Magnesium Melting and Aluminum Ladle Preheating Through Direct Radiant Gas Firing.

Malleable Iron Division

For the Malleable Iron Division, it is planned to devote attention to malleable melting practices. Chairman of this Division is A. M. Fulton, Northern Malleable Iron Co., Minneapolis, the work of the program committee being conducted under chairmanship of Carl F. Joseph, Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. Papers for this session, composing a symposium, cover the following material:

Introduction.

Air Furnace—Pulverized Coal Fired.

Melting with Fuel Oil in the Air Furnace.

Air Furnace—Cupola Duplexing.

Cupola-Electric Duplexing.

Cupola Melting for Malleable Fittings.

Open-Hearth Melting.

Bracklesburg Furnace Melting.

Refractories Practice for Malleable Furnaces.

Practical Points in Malleable Melting.

An outstanding group of malleable iron melting authorities are preparing the material for this important symposium. In addition, the Malleable Division

Fountain of the Union Station Plaza at St. Louis, scene of the War Production Foundry Congress, April 28-30.

will hold a round-table meeting at which there will be "off-the-record" discussions of special war problems in connection with malleable castings production.

Steel Castings

Functioning under chairmanship of C. E. Sims of Battelle Memorial Institute, Columbus, Ohio, the Steel Division is sponsoring some three sessions of papers, the latter being obtained through the program committee headed by T. N. Armstrong, International Nickel Co., New York. Some of the subjects to be considered:

Cores for Steel Castings.

Report of Committee on Radiography.

Quantity Production of Manganese Steel.

Use of Aluminum in 1000 Steel Heats.

Converter Practice.

Report of Committee on Non-Destructive Testing.

Porosity and Bleeding of Ferrous Castings.

Report of Committee on Heat Treatment of Steel Castings.

T. D. West, Deere & Co., Moline, Ill., is chairman of the Steel Division round-table luncheon now planned.

Gray Iron

The Gray Iron Division, under chairmanship of F. J. Walls, International Nickel Co., Detroit, is sponsoring a three-session shop course dealing, as previously announced, largely with cupola operation. Mr. Walls also is chairman of that division's program committee, and discussion leaders of the shop course sessions are members of the Association's Cupola Research Committee.

A most unusual and informative series of meetings on Gray Cast Iron as an Engineering Material is being developed under the chairmanship of R. G. McElwee, Vanadium Corp. of America, Detroit. Purpose of these meetings is to present information on the latest specifications and testing methods, and to show the many possible applications of various types of iron castings.

Subjects of papers for other sessions of the Gray Iron Division are as follows:

Cement Molding Practice in a Gray Iron Shop.

Core Blowing.

Application of Modern Controlled Methods to Produce Heavy Gray Iron Castings.

Welding of Cast Iron.

Heat Treatment of Cast Iron for Oil Field Equipment.

Cupola Combustion.

Carbon Control in Cupola Melting.

Tentative Schedule of Sessions

2nd War Production Foundry Congress

St. Louis, April 28-30, 1943

WEDNESDAY, APRIL 28

10:00 A.M. Opening Meeting.

12:30 P.M. Malleable Division Round-Table Luncheon.

2:00 P.M.
(1) Aluminum and Magnesium Practice.
(2) Molding and Core Making.
(3) Foundry Costs—Govt. Contracts.

4:00 P.M.
(1) Heading and Gating of Castings Lecture.
(2) Job Evaluation and Time Study.
(3) Cast Iron.

6:00 P.M. Foundry Instruction in Engineering Schools—Dinner and Meeting.

8:00 P.M.
(1) Sand Shop Course—Aluminum and Magnesium Practice.
(2) Gray Iron Course—Cupola.
(3) Special Session on Training Women for Industry.

THURSDAY, APRIL 29

10:00 A.M. Business and Awards Meeting.

12:30 P.M. Aluminum and Magnesium Division Round-Table Luncheon Discussion.

2:00 P.M.
(1) Malleable Melting Symposium (Section 1).
(2) Patternmaking.
(3) Steel.
(4) Gray Iron—Symposium on Gray Cast Iron as an Engineering Material (Section 1).

4:00 P.M.
(1) Heading and Gating of Castings Lecture.
(2) Brass and Bronze.
(3) Malleable Melting Symposium (Section 2).

6:30 P.M. Foreman Training Committee Dinner.

8:00 P.M.
(1) Foreman Training.
(2) Sand Shop Course.
(3) Gray Iron Shop Course—Cupola Operations.
(4) Malleable Melting Symposium (Section 3).
(5) Aluminum and Magnesium.

FRIDAY, APRIL 30

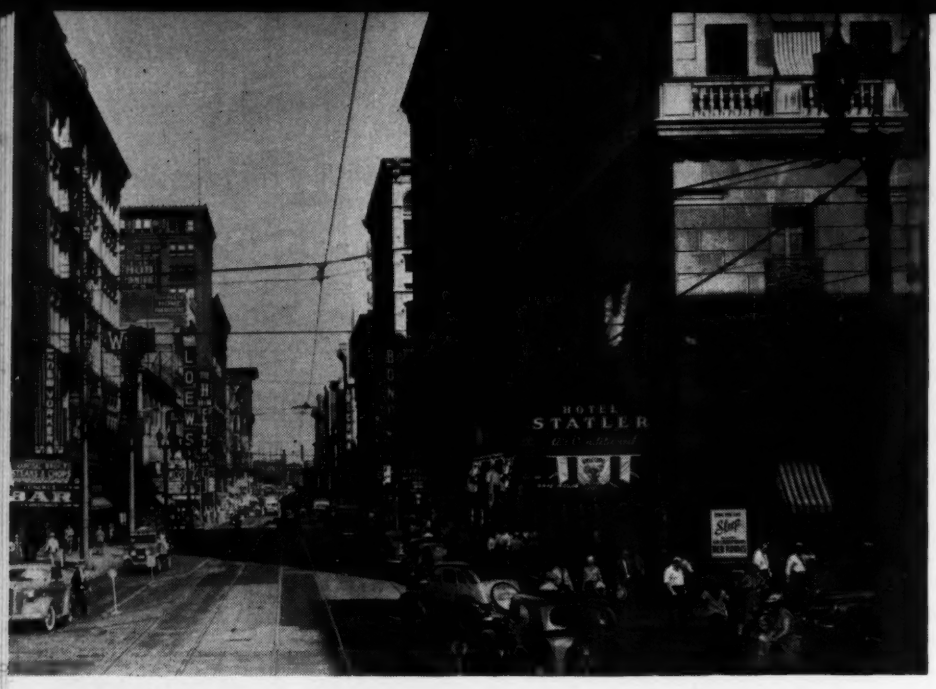
10:00 A.M.
(1) Steel.
(2) Brass and Bronze.
(3) Apprentice Training.
(4) Sand Research.
(5) Gray Iron—Symposium on Gray Cast Iron as an Engineering Material (Section 2).

12:30 P.M.
(1) Steel Division Round-Table Luncheon.
(2) Brass and Bronze Division Round-Table Luncheon.

2:00 P.M.
(1) Safety and Hygiene.
(2) Refractories.
(3) Gray Iron—Symposium on Gray Cast Iron as an Engineering Material (Section 3).

4:00 P.M.
(1) Heading and Gating of Castings Lecture.
(2) Plant and Plant Equipment.
(3) Steel.

8:00 P.M.
(1) Annual A.F.A. Dinner.
(2) Sand Shop Course.
(3) Gray Iron Shop Course—Cupola.



Washington Blvd. in St. Louis will become familiar to many who attend the 1943 Foundry Congress.

Brass and Bronze

A round-table discussion group and two technical sessions have been arranged for the Brass and Bronze Division, under chairmanship of Wm. Romanoff, H. Kramer & Co., Chicago. A symposium on manganese bronze, featuring Recommended Practices for Manganese Bronze, Lead in Manganese Bronze, and effect of lead on the physical properties of that alloy, is being scheduled. Other subjects for discussion include Recommended Practices for Aluminum Bronze, Recommended Practices for Silicon Bronze, and Centrifugal Casting of Brass and Bronze.

Patternmaking Sessions

The Patternmaking Division of the Association, chairman of which is Vaughan Reid, City Pattern Works, Detroit, with Frank Cech of the Cleveland Trade School, Cleveland, serving as vice-chairman, is planning on discussion of many interesting subjects, including the following:

Insurance Protection of Patterns.

Job Analysis and Predetermining of Time Values for Patternmaking.

Training Activities

The Association's committees on apprentice and foreman training will take up special problems of this type of training under war conditions. For the Foreman Training group, under chairmanship of W. G. Conner, Jr., Walworth Company, Washington Park, Ill., a dinner meeting will be held, followed by a round-table discussion.

Jas. G. Goldie, Cleveland Trade School, is chairman of the Apprentice Training Committee, which has arranged for two outstanding speakers at its session: Richard Falk, Falk Corporation, Milwaukee, and W. J. Hebard, Continental Roll & Steel Foundry Co., E. Chicago, Ind. Chairman of the Apprentice Training Program Committee is C. J. Freund, University of Detroit, Detroit.

Safety and Hygiene

Special problems of the foundry industry in connection with the war problems of safety and hygiene will be discussed in a round-table meeting under chairmanship of Jas. R. Allan, International Harvester Co., Chicago.

Foundry Refractories

At technical sessions of the Committee on Foundry Refractories, conservation of foundry refractories will be discussed. Chairman of this committee is J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala.

Plant and Plant Equipment

Program for the Plant and Plant Equipment Committee session is being arranged under Chairman James Thomson, Continental Roll & Steel Foundry Co., East Chicago. Three subjects are up for discussion here:

Infra-Red Lamp Drying of Cores and Molds.

Core Sand Reclamation Methods.

Foundry Maintenance Under Wartime Conditions.

Plan Broad Program On the Light Metals

THE new Aluminum and Magnesium Division of A.F.A., under the general chairmanship of Dr. N. E. Woldman, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J., has planned an extensive program for the 1943 St. Louis Convention, the first annual meeting in which it has officially participated.

The division now has scheduled a session at which recommended practices for the founding of magnesium and aluminum alloys will be presented and discussed. Two additional papers will be presented, one dealing with the important subject of chemical analyses of sands for magnesium castings and another with thermal gradients in molds and cores for magnesium alloys.

Plan Steel Program For Varied Interest

THE Steel Division of A.F.A., under the general chairmanship of C. E. Sims, Battelle Memorial Institute, Columbus, Ohio, will hold meetings on Thursday, April 29, and on Friday, April 30. The Thursday afternoon session on steel castings will feature papers dealing with the subjects of cores and radiography and will include the annual Institute of British Foundrymen Exchange Paper on "Quantity Production of Manganese Steel."

At the Friday morning session discussion will cover the use of aluminum in 1000 steel heats, converter practice, and the report of the Committee on Non-Destructive Testing. The third session on Friday afternoon will discuss porosity and bleeding of ferrous castings and the report

of the Committee on Heat Treatment.

Scheduled for Friday noon is the round table luncheon of the division, and plans are going forward for this meeting.

A feature of the Steel Division program is the varied interest in the program, all of the various papers being directly applicable to the production of castings for war purposes.

Develops Symposium on Gray Iron as Engineering Material

AN UNUSUALLY valuable piece of technical and engineering work for gray iron foundrymen is being developed as a "Symposium on Cast Iron as an Engineering Material," sponsored by the A.F.A. Gray Iron Division under direction of a special committee headed by R. G. McElwee, Vanadium Corp. of America, Detroit. Assignments for the various sections have been accepted by a group of outstanding metallurgical men who are collecting the best available authoritative data on the various engineering properties.

This Symposium, which will feature the gray iron section of the program for the Foundry Congress in St. Louis, April 28-30, will be presented in a series of three sessions of greatest interest to all gray iron foundrymen. It is being prepared to assist the foundry industry in its contacts with engineering and designing departments. To benefit from it in the greatest degree, everyone who possibly can should participate.

All information dealing with engineering properties should be submitted, especially all information describing unusual applications. Each property, including tensile, transverse, compressive, torsional strength, and damping capacity, will be presented and discussed by one of the leaders of research in gray iron, and opportunity for floor discussion will be offered at the Congress.

The symposium will be published from the information disclosed, and plans have been made for its distribution in such a manner as to be most helpful for contact purposes. It is hoped that the findings will result in wider acceptance of official specifications as a basis for sales.

Each foundryman and research man should accept this as a personal invitation to participate. Data should be submitted to R. G. McElwee, 2440 Book Tower, Detroit, Mich.

Brass and Bronze Men To Stress War Metals

UNDER the general chairmanship of Wm. Romanoff, H. Kramer & Co., Chicago, the Brass and Bronze Division of A.F.A. will feature at the 1943 St. Louis Annual Meeting a symposium on manganese bronze, to be held Thursday, April 29. In line with the government's efforts to de-grade various alloys to cooperate with the materials shortage, the symposium will dwell on recommended practices for producing of manganese bronze and the effect of lead on its physical and other properties.

A second session will be held Friday, April 30. This meeting will cover recommended practices for both aluminum and silicon bronzes. Of special interest at this session will be a paper on the hows and whys of centrifugal casting of brass and bronze.

The annual round-table conference will discuss the proper methods and procedures of determining the temperature of molten metals, a subject of great importance because of its influence on the production of sound castings.

Recommended practices to be presented at the various sessions cover these alloys which are being used extensively in the war production effort, and should be of interest to all those who are now producing or anticipate producing these widely used types of bronzes.

Pattern Division to Study Job Analysis

THE matter of job analysis and predetermining of time values for patternmaking, an important subject for the patternmaking industry, will be discussed at a session of the A.F.A. Patternmaking Division at the St. Louis Annual Meeting on Thursday, April 29. Vaughan Reid, City Pattern Works, Detroit, is general chairman of the

(Photos courtesy Jerry Reichart, Caterpillar Tractor Co.)

Snapshots taken during recent inspection tour of Caterpillar Co. plant by high ranking U. S. Engineers and Ordnance officers. Left to right—L. B. Neumiller, president, Caterpillar Tractor Co.; H. S. Eberhard, vice-president; M. J. Gregory, factory manager and National Director of A.F.A.; Brig. Gen. Raymond F. Fowler, Chief of Supply Division, U. S. Engineers, Washington, D. C.; Gen. Chas. Keller, District Engineer, Chicago District. Others who made the inspection tour of the plant included Lt. Col. W. H. Hastings, Executive Assistant in Charge of Procurement, Division Engineers, Great Lakes Division, other company officials and representatives of the Plant-Labor Management Committee.

division and will preside at the session.

Another subject of special interest to patternmakers is the matter of insurance. This subject will be discussed by representatives of the Freese Insurance Co., Detroit.

The application of job analysis to the patternmaking industry is a subject of increasing interest, in view of the manpower situation at present, and probably will increase in value and interest as the situation becomes more critical.

Aluminum-Magnesium Advisory Group Organizes Division

ON January 29, the Aluminum and Magnesium Division Advisory Committee met at Hotel Cleveland, Cleveland, Ohio, for the purpose of formulating an organization for the division to render service to the aluminum and magnesium castings producers of the country. Dr. N. E. Woldman, Chief Metallurgical Engineer, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J., general chairman of the division, presided.

The meeting was an enthusiastic one and well attended. Those who participated are as follows:

J. G. Frost, Aluminum & Magnesium Corp., Sandusky, O.; Dr. B. Egeberg, International Silver Co., Meriden, Conn.; A. W. Stolzenberg, Aluminum Co. of America, Detroit; A. T. Ruppe, Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.; W. E. Martin, Sperry Gyroscope Co., Brooklyn, N. Y.; H. J. Rowe, Aluminum Co. of America, Cleveland; C. C. Hitchcock, R. C. Hitchcock & Sons, Minneapolis, Minn.

Leslie Brown, Magnesium Fabricators Div., Bohn Aluminum & Brass Corp., Adrian, Mich.; George H. Starmann, Apex Smelting Co., Chicago; Hiram Brown, Frontier Bronze Corp., Niagara Falls, N. Y.; Charles E. Nelson, Dow Chemical Co., Midland, Mich.; Robert E. Ward, Eclipse Fdry. Div., Eclipse Aviation, Bendix, N. J.; M. E. Brooks, Dow Chemical Co., Bay City, Mich.; Dr. Robert Thomson, Dodge-Chicago Plant, Chrysler Corp., Chicago.

The following members were unable to attend the meeting: Dr. J. T. Eash, International Nickel Co., Bayonne, N. J.; J. B. Neiman, Federated Metals Div., American Smelting & Refining Co., Detroit; H. J. Deutsch, American Magnesium Corp., Buffalo, N. Y.; H. G. Lamker, Wright Aeronautical Corp., Paterson, N. J.; B. D. Claffey, Gray Iron & Aluminum Div., General Malleable Corp., Waukesha, Wis.

R. E. Kennedy, Association Secretary, acted as Secretary pro tem and reported on the program being sponsored by the division at the 1943 War Production Congress. Following this report and a discussion of the prospective activities of the division, Leslie Brown, Magnesium Fabricators Div., Bohn Aluminum & Brass Corp., Adrian, Mich., was appointed Vice Chairman of the Advisory Committee and R. E. Ward, Eclipse Foundry Div., Eclipse Aviation, Bendix, N. J., as Secretary, Dr. Woldman continuing to serve as Chairman. The Aluminum and Magnesium Division will seek official representation on A.S.T.M. committees as shown below.

Committees Appointed

In addition, the following committees, together with their personnel, were appointed:

Sand Castings
A. T. Ruppe, *Chairman*
H. J. Rowe
Manley E. Brooks
C. C. Hitchcock

Die Castings
(Chairman to be appointed)
C. E. Nelson
R. E. Ward
Wayne E. Martin.

Permanent Mold Castings
(Chairman to be appointed)
R. E. Ward
Dr. B. Egeberg
C. C. Hitchcock
J. G. Frost
A. W. Stolzenberg

Reclamation and Alloying
G. H. Starmann, *Chairman*
J. G. Frost
Dr. B. Egeberg
J. B. Neiman

Plaster Molding
(Chairman to be appointed)
Leslie Brown
C. E. Nelson

Program and Papers
Wayne E. Martin, *Chairman*
Dr. B. Egeberg
A. W. Stolzenberg
Leslie Brown

Representatives on A.S.T.M. Committee on Radiography
Dr. Robert Thomson
Leslie Brown

The remainder of the meeting was devoted to a discussion of subjects for future papers and to plans to assist the new committees in functioning.

Bound Vol. 50 of A.F.A. Transactions in Mails

THE Bound Volume of A.F.A. *"Transactions,"* covering all papers and discussions presented at the 1942 annual meeting of the Association, is now off the press and is being shipped to members. This edition, Vol. 50, contains over 1400 pages and is one of the largest and most extensive volumes ever published by A.F.A.

Because the 1942 Foundry Congress was held after America went to war, many of the papers had definite bearing on production of vital war materials, making the new *"Transactions"* of more than usual immediate practical value. Much of the material has never been published elsewhere.

All Company Members of A.F.A. are entitled to one copy of Bound Volume 50 gratis, on request. Sustaining Members are entitled to one copy for each $25.00 of membership dues paid, again on request. Other Association members may obtain copies at $4.00 each, a price that barely covers greatly increased production costs. *"Transactions"* also is available to non-members at $15.00 per copy.

Order forms have been sent all members, and it is urged that those who have not yet ordered their copies should do so promptly, as the supply of the 1942 Bound Volume is limited.

Some Causes of Porosity Occurring in Navy "G" and Similar Non-Ferrous Alloys†

By W. B. George,* Chicago, Ill.

Presentation of the following paper at this time is particularly timely, in view of existing shortages of copper. The discussion of causes of porosity in Navy "G" and similar alloys, it is hoped, may be of value in saving castings and improving production through decreasing the number of rejects. For purposes of comparison a cylinder liner is analyzed, porosity in these liners being essentially the same as in other types of castings where defects often are hidden by an unmachined surface.

THE POROSITY encountered in Navy "G" and similar alloys is so closely related that they can be discussed together. The lead in some of these alloys promotes pressure tightness and machinability.

For simplicity, let us select a cylinder liner 16 in. inside diameter, 18 in. outside diameter and 24 in. long. This liner is to be finished and to withstand 250 lbs. per sq. in. air pressure. The finished castings must be free of all imperfections and subject to test pieces cut from any section to check density and physical properties. Metal to be composition "G" of the specifications shown in Table 1.

In the making of castings of this type, most of the known causes of porosity will be brought out before such castings can be made consistently good. The porosity encountered in these liners is the same as in other types of castings where such defects are often hidden by an unmachined surface.

*Foundry Engineer, R. Lavin & Sons, Inc.
†This paper was presented at the Non-Ferrous Division Round Table Conference at the 46th Annual A.F.A. Convention, Cleveland, Ohio, April 21, 1942.

Table 1

Chemical and Physical Specifications Of Navy "G" Alloys

Navy "G" 46M6G	Specification No.
Composition	
86.00 - 89.00	Copper, %
7.50 - 11.00	Tin, %
0 - 0.30	Lead, %
1.50 - 4.50	Zinc, %
0.10	Iron, Max., %
1.00	Nickel, Max., %
0.05	Phosphorus, Max., %
Minimum Physical Properties	
40,000	Tensile Strenth, p.s.i.
20	Elongation in 2-in., %

Following are some of the causes of porosity in this type of work due to imperfect foundry practice.

Effect of Low Permeability

Fig. 1 shows a type of porosity due to too low permeability of the molding sand. The holes vary in color, some being black, green, brown, red, orange and yellow. This defect often affects pressure tightness. These are water vapor holes from metal boiling in low permeable sand. Slag deposits will be found among the holes, associated with green skin films embedded in the castings.

Sand permeability is probably around 12, where 40 would be more satisfactory. Test bars under this condition probably will be lost, showing only about 35,000 p.s.i. tensile strength and 18 per cent elongation.

There are two kinds of water vapor, one that shows up as holes and is seen by the naked eye, another which separates at the grain boundaries and may be seen with a 10 power magnifying glass. Both classes affect this casting.

Low Sand Strength

Fig. 2 shows a type of porosity caused by too low strength in the molding sand. Color of the holes varies from golden red to golden yellow. This defect does not affect the pressure-tightness of the casting.

This type porosity is caused by water vapor holes from loose sand grains washed into the castings from the sprue and gate. The combined water of the sand grains and clay has been driven off by the high temperature and has sintered the residue into a tiny cinder within the hole. The water has expanded hundreds of times its original dimensions.

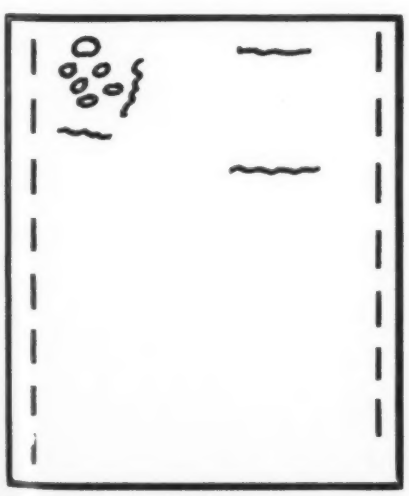


Fig. 1

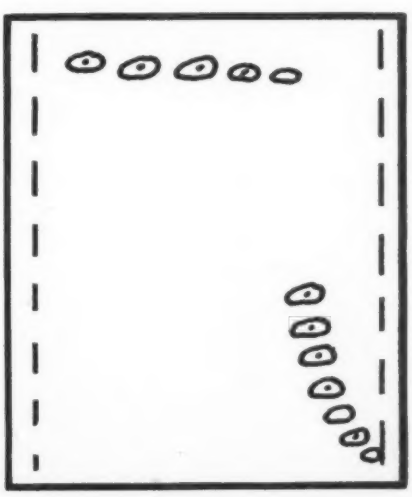


Fig. 2

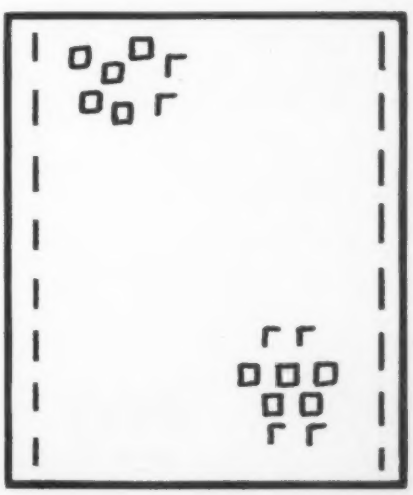


Fig. 3

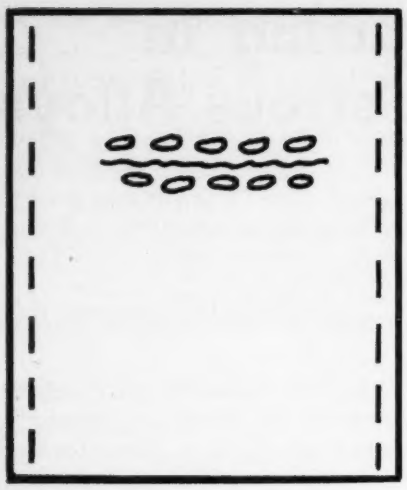


Fig. 4

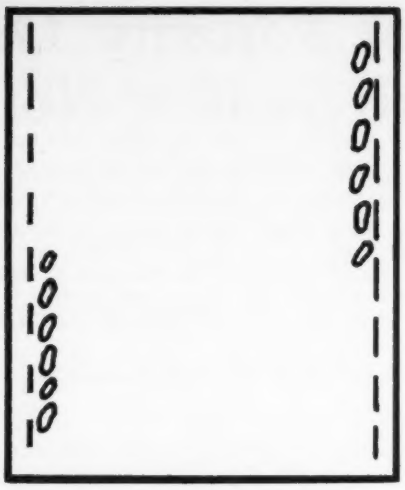


Fig. 5

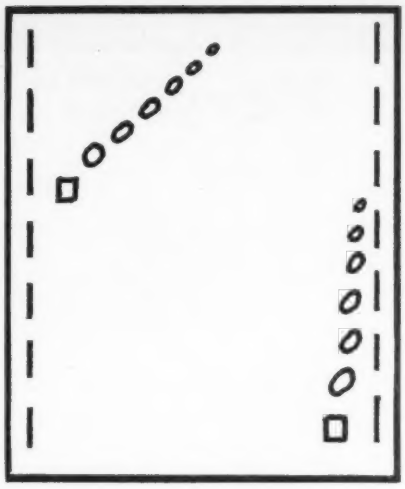


Fig. 6

The sintered residue is usually about 0.005 in. diameter and may be seen with a 10 power glass.

The green strength of the molding sand is probably about 5 p.s.i., whereas 8 p.s.i. would be much better.

Some of the test bars cast under this condition will be lost while others will barely pass, showing a tensile strength of about 40,000 p.s.i. and an elongation of 20 per cent. Here again, some of the water vapor has entered the grain boundaries of the metal.

Molding Sand Too Wet

Fig. 3 shows a type of defect due to the molding sand being too wet. The grains of metal in the defective area have a crystal sugar appearance. Color of the fracture is from gray to golden yellow. This may or may not affect pressure tightness, depending on the degree the metal has been damaged.

The crystalline appearance is due to water vapor from steam, showing up as a granulated structure. This also can be seen under a 10 power glass. Other causes of this defect are strong facings or wet blacking. In such cases, the mold should be skin dried when faced or blackened.

Test bars cast under this condition will be lost, showing about 35,000 p.s.i. tensile strength and 18 per cent elongation.

Gas from Core Buckling

Fig. 4 shows a gas-hole defect caused by gas generated by a core buckle. The holes occur in a straight line and are orange to golden yellow in color. This defect usually is associated with embedded core sand. The defect does not affect the pressure-tightness of the casting.

Overbaked and underbaked core halves should not be pasted together, because the expansion is greater in the overbaked than the underbaked side and the core will buckle, throwng core sand and gas into the casting. Sometimes the halves will rip loose on the pasted seam with the same disastrous results. Halves on large cores should be of the same mixture and baked in the oven at the same time.

Gas from Oxidized Metal

Fig. 5 illustrates the occurrence of gas holes around a core, said to be caused by oxidized metal. The holes range in color from dark red to golden yellow in some castings. In other castings the holes may be black, green, orange and yellow. This defect does not affect pressure-tightness of the castings.

Where such a defect occurs, it is assumed that the oxygen in the metal reduces the core binder to CO, CO_2, etc. Often there are other reactions between the metal and core. All conditions have to be known to place this trouble

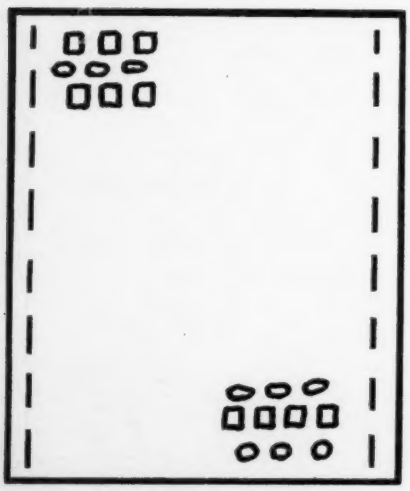


Fig. 7

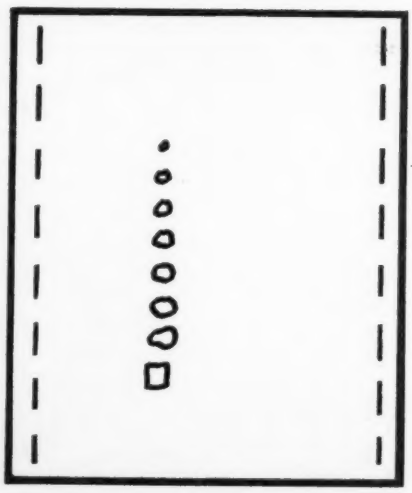


Fig. 8

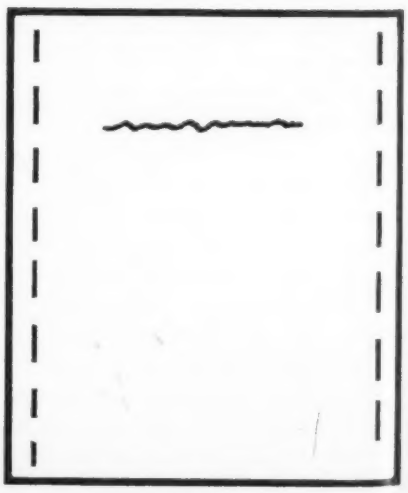


Fig. 9

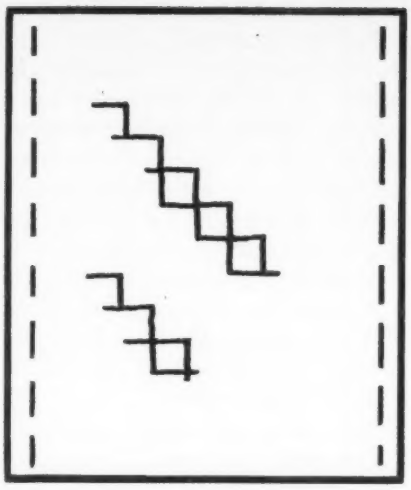


Fig. 10

Fig. 11

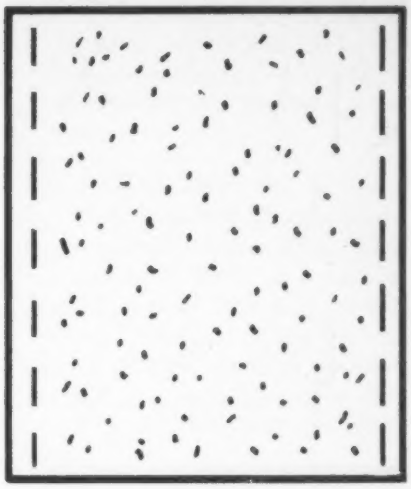


Fig. 12

where it belongs. Oxidized metal should be reduced with phosphorus before pouring over cores.

Swab Used Too Freely

Fig. 6 illustrates the result of using the swab too freely. The holes appear clean and in a straight line. They range in color from golden red to yellow. This defect does not affect the pressure-tightness of the casting.

Similar small gas holes often result from a slag, formed by metal boiling in the sprue or runner. Release of the combined water in the clay-sand mixture is not completed until the slag enters the casting. These holes can be traced by a fracture to the inclusion.

Neutral slag does not throw off gas. The runner of the casting usually shows the fused white color of sand on the skin. Metal will dissolve the linings of improperly glazed ladles and show similar results but, as a rule, with more slag and less gas holes.

Test bars under these conditions will fail, pulling probably only 35,000 p.s.i. tensile strength with 18 per cent elongation.

Ladles Not Dry

Fig. 7 shows a defect attributable to undried ladles. This defect is characterized by fine orange to yellow colored holes associated with gray to yellow crystalline structure on the fracture and often is the cause of leaky castings.

The defect has a spongy appearance and is due to water vapor formed by pouring metal into a green ladle. A ladle should be lined with a mixture of silica sand and fire clay to dry properly. Clay alone will not give up its water under regular methods of drying.

Where a crucible is used as a ladle, it should be preheated to a bright red, as some of the binding material may not be sintered and may contain moisture.

Some of the test bars under these conditions will barely pass and others will fail.

Effect of Dirty Ladles

Fig. 8 shows a defect caused by dirty ladles. The holes are large to small, clean, yellow in color, and in a straight line. The defect does not affect the pressure-tightness of the casting.

These gas holes look like "flying geese" and are caused by a small piece of oxidized metal entrapped in slag that has entered with the stream while pouring. This will happen when the metal covers an old slag line lower in the ladle lining. The oxidized metal is reduced and the gas is released within the casting. Neutral slag does not throw off gas. A piece of oxidized metal can be minute in size and still produce a good sized string of holes.

Use clean ladles and put phos-

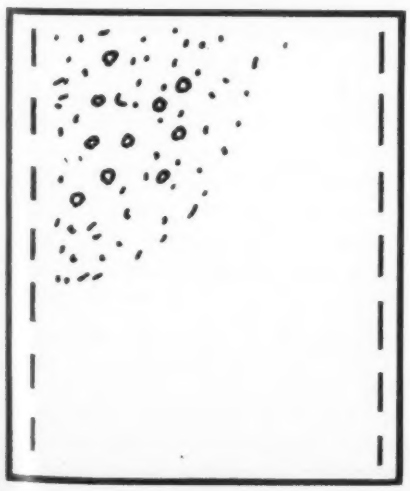


Fig. 13

Fig. 14

Fig. 15

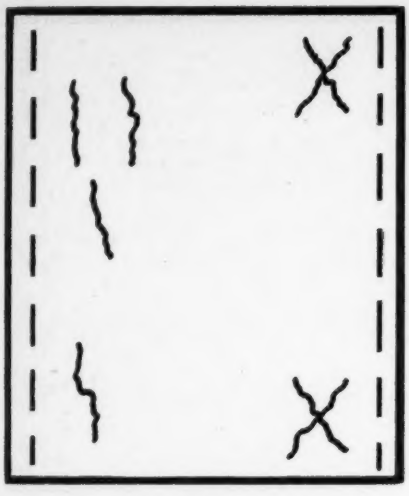


Fig. 16

phorus in bottom of the ladle, allowing enough time to elapse for the reaction of the phosphorus to take place and for the metal to quiet down.

Cope Removed Too Soon

Fig. 9 shows a fine crack with a dark crystal fracture which generally causes the casting to leak. This defect is caused by removing the cope too quickly and allowing the casting to remain in the drag. Uneven contraction, caused by shaking out while too hot, will crack these alloys. Let the castings cool within the molds. If the exposed surface of the casting turns black after removing it from the mold, the casting has been taken from the mold while it is too hot.

Test bars are likely to heat crack and fail if removed from the mold while they are too hot.

Too Rapid Cooling

Fig. 10 illustrates a defect caused by cooling the casting too rapidly. This defect consists of fine, dark, checkered lines which show up after machining. If pressure tested, the casting will leak.

This defect may be caused by placing the casting in a sandblast while it is hot, or by trying to cool the outside surface by air or water spray. Allow the casting to cool within the mold naturally.

Here again, test bars are likely to heat check and fail if removed from the mold while too hot or if cooled too rapidly.

Pouring Metal Too Hot

Fig. 11 shows a defect caused by pouring the metal while it

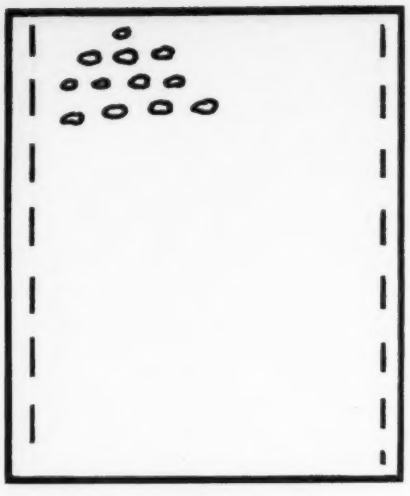


Fig. 17

was too hot. It appears as an orange, yellow or golden cleavage in the wall of the casting and causes leakage.

The too-high pouring temperature has destroyed the advantage of directional solidification. Such

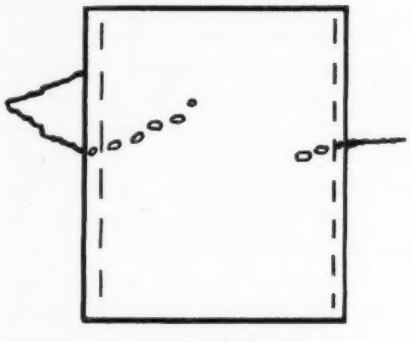


Fig. 18

a defect indicates that the metal was poured at least 200° F. above the proper temperature.

Test bars cast under these conditions will be lost, some dropping to as low as 15,000 p.s.i. tensile strength and 5 per cent elongation.

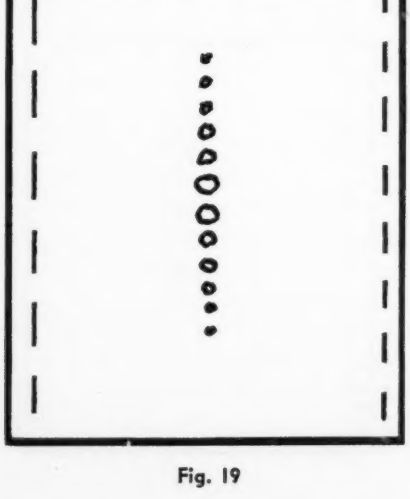


Fig. 19

Overheating and Soaking

Fig. 12 illustrates a defect due to overheating and soaking the metal. It is characterized by a porous, evenly-distributed sponginess. The sprue may have shrunk but a small copper-tin button usually is forced out on top of the shrink. Such a defect may cause the casting to leak. Do not heat the metal more than 100° F. above the temperature needed to cast it, and do not let it soak in the furnace.

Test bars cast under this condition will be lowered in physical properties, with many not passing the requirements.

Poor Furnace Combustion

Fig. 13 illustrates porosity consisting of clean brown, red, orange and golden yellow holes. This type porosity causes leaky castings and is due to improper combustion in the melting furnace.

Metal absorbs gases rapidly under high temperatures and reducing atmospheres, and this gas is liberated in proportion to its cooling rate within the casting. In oil, gas-fired and coke furnaces, a slight amount of unburned oxygen in the combustion discharge is desirable.

The sprue and risers do not shrink when metal is gassed. They usually bulge on top.

Test bars cast under this condition will fail, some dropping to as low as 25,000 p.s.i. tensile strength and 10 per cent elongation.

Steam Holes

Fig. 14 illustrates a defect

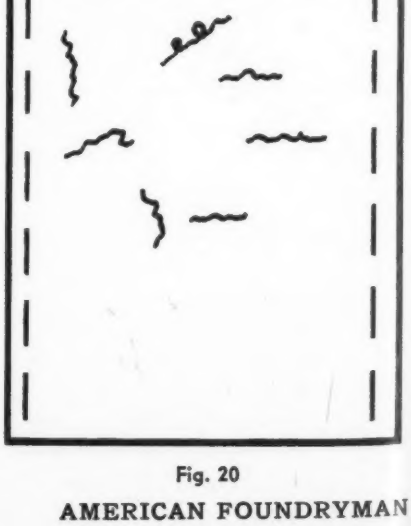


Fig. 20

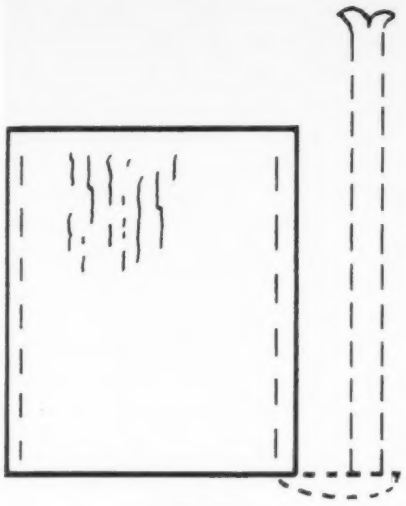


Fig. 21

known to be caused by steam and occurring just opposite a soft spot in a mold. The steam holes are golden yellow in color but do not affect the pressure-tightness of the casting. The metal becomes embedded in the sand of this soft spot and shuts off its vent to the outer mold, driving water vapor back into the casting.

Gas Holes

Fig. 15 shows a defect which does not affect the pressure-tightness of the casting. It consists of gas holes of golden yellow color and occurs opposite a soft spot in a core. The metal embeds some of the sand completely and shuts off the vent into the core, driving back gases into the casting.

Low Hot Strength

Fig. 16 shows a defect characterized by porous grain structure under spots where the metal has drained into the core, causing fins, etc., often resulting in leaky castings. In this case, it will be found that the core lacked sufficiently high hot strength and that segregated alloy, of different analysis than the casting, has drained from the casting, leaving a structure that often will leak.

In analyzing fins that eat into the cores on a casting made from an alloy containing 88 per cent copper, 8 per cent tin and 4 per cent zinc, you are likely to find 72 per cent copper, 16 per cent tin and 8 zinc. The metal that penetrated into the core has a lower melting temperature than that of the casting and drains out through the grain boundaries, leaving a structure that is porous. Risers will not always take care of this condition. Metal will not penetrate into cores any more than molds, when they have the same hot strength.

There are four methods used to overcome this infiltration. They are: (1) the use of more molding sand in the core mixture, (2) addition of clay, (3) addition of silica flour, or (4) the addition of ferric oxide. Ferric oxide does not lower the permeability of the core appreciably and is recommended where clay or fines are not permissible.

Improperly Dried Charcoal

Fig. 17 shows a defect consisting of large and small, clean holes which range from orange to yellow in color. This defect, while seldom affecting pressure-tightness, may also show a granulated structure.

The condition is due to placing improperly dried charcoal in the bottom of a ladle and pouring metal on top of it. Charcoal contains water and, unless dried just before using, the moisture will combine with the metal.

Test bars under this condition are likely to fail.

Fins and Cracks

Fig. 18 illustrates a defect caused by a fin in the casting or a crack in the mold. It is characterized by even sized, clean holes of golden yellow color. The defect does not affect the pressure-tightness of the casting.

In this case, directional holes are driven back into a casting by a fin or crack in a mold. In both green and dry sand molds, the fin shuts off the vent in the sand and the gas generated in the corner pockets is forced into the casting.

Paste in Core Seams

Fig. 19 shows a defect consisting of small to large, clean, golden yellow holes. These are steam holes caused by paste or mud in the core seams. This defect does not affect pressure-tightness.

Core seams should be filled with a fine molding sand and blackened over. If a piece has broken out of the core, paste in a section of core to fill the hole. Do not fill it with mud or black lead. Pasted overbaked and underbaked core halves will often rip on the seam and produce similar holes.

Dross Inclusions

Fig. 20 illustrates dross inclusions embedded in the side walls of a casting. They are oxide films and appear red and green colored on fracture. This defect seldom affects pressure-tightness, except when the film extends completely through the section.

These oxide films generally result from excessive strings of oxidized metal on the lip of the ladle. Metal should contain enough phosphorus to dissolve these films, otherwise they will flow back into the casting and will not redissolve. Usually 0.01 per cent phosphorus will counteract this trouble. This is usually added as 1½ oz. of 15 per cent phosphor-copper shot.

Some test bars will be lost from these films. As a rule, the others will show exceedingly good properties, due to the metal being on the oxidized side.

Improper Gating

Fig. 21 shows a defect due to improper gating. This defect appears as a coarse, crystalline structure of brown, red, orange and golden yellow on fracture. It is internal shrinkage and will cause castings to leak.

Incorrect Risers

Fig. 22 shows the result of using a properly proportioned gate but an improperly proportioned

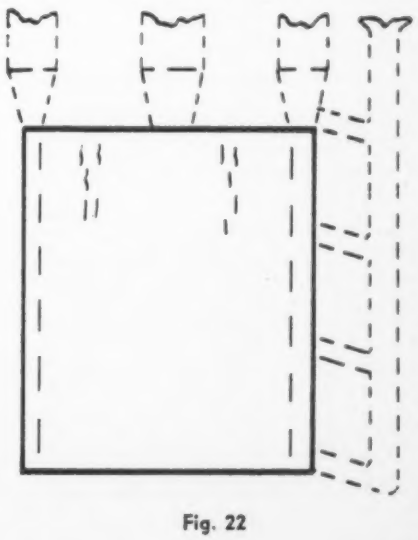


Fig. 22

riser. The defect shown above appears as a coarse, crystalline structure which is brown, red, orange and golden yellow on fracture.

This defect is internal shrinkage due to risers being too far apart. Castings with this defect will leak.

Ideal Gating and Risering

Fig. 23 illustrates the ideal method of gating and risering the type casting being discussed to produce sound castings. The author believes that the best method is to employ a ring riser with pencil gates so proportioned as to produce directional solidification. For this casting, four 3/8-in. pencil gates should be used, together with a pouring temperature of approximately 2075° F.

Test Bars for Navy "G"

In checking test bars that have failed, our experience has been that losses can be classified approximately as follows, according to the defect which caused the failure:

Defect	*Per Cent*
Water Vapor	75
Gassed Metal	10
Hot Pouring	5
Cold Pouring	3
Oxidized Films Within the Bars	2
Other Causes	5

In the author's experience, foundries who have had the most outstanding results on test bars are those who use skin dried molds or cores, using the fin

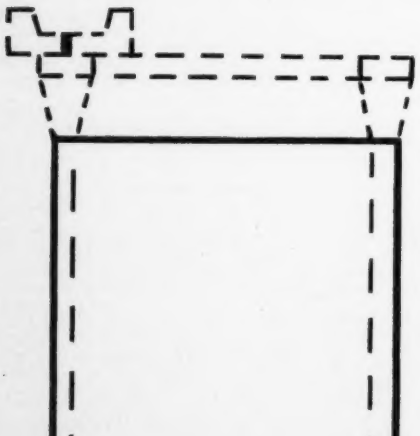
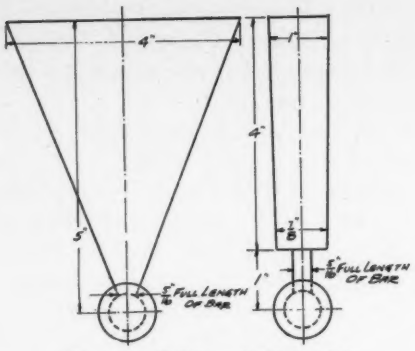


Fig. 23



Figs. 24 (left) and 25 (right)

gate type bars (Fig. 25) recommended for "G" metal by the Navy and A.S.T.M. One company casting in a core averages 48,000 p.s.i. tensile strength with 36 per cent elongation. Another company, using a core and this same dimension bar but widening the riser at the top to 4 in., as shown in Fig. 24, and tapering it down to 5/16 in. at the point where it joins the casting, is able to maintain high tensile strengths and increase the elongation, on an average, to better than 55 per cent. The cores must be kept warm and dry to maintain these high properties.

It has been the author's experience that water vapor must be guarded against to obtain good, consistent results.

Two Stalwarts of The Association Die

MEMBERS of the Association will be saddened by the announcement of the death of two men who spent practically their entire lives in the Foundry Industry, G. A. T. Long, Pickands, Mather & Co., and W. C. Packard, National Engineering Co., Chicago.

George Long was known to a host of friends. He was 85 years old and enjoyed a full and useful life in the foundry industry, his interest in the industry dating back many years. He participated in many conventions and had the distinction of attending all A.F.A. conventions, including the first in 1896. In 1940, in recognition of his long service to the industry, he was made a Life Member of the Association.

Mr. Long actively contributed, through presentation of papers and discussions, to the practical operation of the foundry cupola, in which field he was best known. His personal interest in the early exhibits of his company at conventions of A.F.A. made them outstanding because of their originality. Many "old timers" will remember his various scenes built of foundry coke and exhibited in the booth of Pickands, Mather & Co.

Mr. Packard, Asst. Sales Mgr. and Treasurer, National Engineering Co., Chicago, was 50 years old and was well known throughout the industry because of his long association with the National company. "Win" was a great believer in A.F.A. and in the future of the foundry industry. He was one of the men whose enthusiasm led to the formation of the first chapter of A.F.A., the Chicago Chapter, and he served as its first secretary, continuing for 3 years.

In the death of these two men, both the foundry industry and the Association have sustained a severe loss, and members of the Association will miss them.

Red Cross Commences Greatest Fund Drive

MARCH has been proclaimed "Red Cross Month" by President Roosevelt, during which the American Red Cross will stage its 1943 War Fund campaign. The national

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Help! Help!

goal of $125,000,000, the largest amount ever sought in a single campaign, is intended to finance all Red Cross activities for the year, including greatly expanded services to the Armed Forces, to their families, and for normal civilian needs.

R. G. McElwee to Head Cupola Research Project of A.F.A.

R. G. McELWEE, Vanadium Corporation of America, Detroit, has been appointed General Chairman of the Cupola Research Committee. Mr. McElwee, who has been a member of the Cupola Research Committee since the project was organized, also is serving as Chairman of the Committee on Ferrous Metals and Alloys, Chairman of the Subcommittee on Alloys, and as a member of the Steering Committee.

He succeeds Donald J. Reese, International Nickel Co., Inc., New York, who has so ably served as Chairman for the past two years. Both Mr. Reese and Mr. McElwee are connected with the WPB at Washington, Mr. Reese as Chief, Iron-Steel Manufacture Section, Raw Materials and Facilities Division, while Mr. McElwee has handled the cast iron work of the Forgings and Castings Unit, Wire and Heavy Products Branch.

Mr. McElwee, as Chairman of the General Committee on Cupola Research, will also serve as Chairman of the Steering Committee, with Max Kuniansky, Lynchburg Foundry & Machine Co., Lynchburg, Va., remaining as chairman of the Finance Committee and of the Committee on Scrap.

The chairmen of the other committees of the project are:

Committee on Equipment — Jas. Thomson, Continental Roll & Foundry Co., East Chicago, Ind., with A. DeYoung, Whiting Corp., Harvey, Ill., as Secretary.

Committee on Operation—H. Kenneth Briggs, Miller & Co., Chicago, with G. P. Phillips, International Harvester Co., Chicago, as Vice-Chairman.

Committee on Refractories—J. F. Oesterle, University of Wisconsin, Madison, Wis., and J. A. Kayser, Laclede Christy Firebrick Co., St. Louis, Mo., Vice-Chairman.

Committee on Slags, Fluxes and Desulphurizers—George S. Evans, Mathieson Alkali Works, New York City.

Committee on Fuels and Combustion—S. C. Massari, Captain U. S. Army Ordnance, Chicago.

Subcommittee on Pig Iron—T. G. Johnston, Republic Steel Co., Cleveland.

Working with the Steering Committee in an editorial capacity is Dr. E. E. Marbaker, Mellon Institute, Pittsburgh.

Mr. Kuniansky, Chairman of the Finance Committee, reports a large number of new contributors to the project, shown below. Some chapters have had committees working with Mr. Kuniansky. These committees have been exceptionally helpful in securing funds to carry on this work, and the Cupola Research Committee and the Association wish to acknowledge their assistance. These chapters, with the chairmen of their Cupola Research Contribution Committees, are as follows:

R. G. McElwee

J. F. Oesterle, University of Wisconsin, Madison; Wisconsin Chapter.

C. B. Shanley, Semi-Steel Casting Co., and Webb Kammerer, Midvale Mining and Mfg. Co., St. Louis; St. Louis District Chapter.

Henry S. Washburn, Plainville Casting Co., Plainville, Conn., New England States.

E. C. Hoenicke, Eaton Mfg. Co., Fdry. Division, Detroit; Detroit Chapter.

J. H. Tressler, Hickman Williams & Co., Cleveland; Northeastern Ohio Chapter.

W. A. Bachman, New York Central R. R. Co., Elkhart, Ind.; Michiana Chapter.

R. D. Loesch, Lake Erie Foundry Co., Buffalo; Western New York Chapter.

S. D. Russell, Phoenix Iron Works, Oakland, Calif.; Northern California Chapter.

J. J. Fox, Wisconsin Steel Co., Chicago; Chicago Chapter.

F. F. Shortsleeve, Elmira, N. Y.; Central New York Chapter.

Fulton Holtby, University of Minnesota, Minneapolis; Twin City Chapter.

R. F. Flora, The Clover Foundry Co., Muskegon, Mich.; Western Michigan Chapter.

A. D. Matheson, French & Hecht, Davenport, Iowa; Quad City Chapter.

Henry C. Seidel, Penn-Rilton Co., New York; Metropolitan Chapter.

Henry J. Noble, American Cast Iron Pipe Co.; Birmingham Chapter.

Cupola Research Project

Additional Pledges

January 21 to February 16, 1943

Allyne-Ryan Foundry Co., Cleveland.
Atlantic Foundry Co., Akron, Ohio.
Brown Industries, Inc., Sandusky, Ohio.
City Foundry Co., Cleveland.
Clover Foundry Co., Muskegon, Mich.
East Akron Casting Co., Akron, Ohio.
Deere & Co., Moline, Ill.
Elyria Foundry Div., Industrial Brownhoist Corp., Elyria, Ohio.
Fanner Manufacturing Co., Cleveland.
Fate - Root - Heath Co., Plymouth, Ohio.
Ferro Machine & Foundry Co., Cleveland.
Foundry Equipment Co., Cleveland.
French & Hecht, Inc., Davenport, Iowa.
Fulton Foundry & Machine Co., Inc., Cleveland.
G. & C. Foundry Co., Sandusky, Ohio.
Grand Rapids Foundry, Div. of Oliver Machinery Co., Grand Rapids, Mich.
Hickman, Williams & Co., Cleveland.
Hoffman Foundry Supply Co., Cleveland.
Kindt-Collins Co., Cleveland.
Lakey Foundry & Machine Co., Muskegon, Mich.
W. O. Larson Foundry Co., Grafton, Ohio.
J. S. McKesson, Lakewood, Ohio.
Meech Avenue Foundry, Cleveland.
Muskegon Piston Ring Co., Sparta Div., Sparta, Mich.
National Malleable & Steel Castings Co., Cleveland.
National Metal Abrasive Co., Cleveland.
Ohio Foundry Co., Cleveland.
Osborn Manufacturing Co., Cleveland.
Parker-Street Castings Co., Cleveland (Garfield Hgts.).
Sandusky Foundry & Machine Co., Sandusky, Ohio.
Standard Stoker Co., Inc., Erie, Pa.
Sterling Foundry Co., Wellington, Ohio.
Taylor & Boggis Foundry Div., Cleveland.
Urick Foundry Co., Erie, Pa.
A. C. Williams Co., Ravenna, Ohio.
Youngstown Foundry & Machine Co., Youngstown, Ohio.

Metropolitan and W. New York Chapters Active in War Clinics

THE Second War Production Clinic in which the Metropolitan Chapter of A.F.A. cooperated, was held January 7 at Hotel Pennsylvania, New York. This clinic was much more successful than the first. At the first clinic, one session on foundry production was held, and at the January 7th, there were four sessions covering steel, aluminum and magnesium, brass and bronze, and gray iron. A similar clinic also was held in Buffalo recently in which the Western New York Chapter cooperated. Another is being held March 11 in Chicago in which the Chicago Chapter is cooperating.

Buffalo War Clinic

Over 1100 attended the War Production Clinic held February 11 at Buffalo, with the Western New York Chapter an active sponsor. Many foundrymen attended the afternoon and evening sessions, according to report from Wm. S. Miller, Chas. C. Kawin Co., Buffalo, being interested in maintenance, safety and other engineering topics, as well as in the foundry discussions.

The foundry session boasted a packed house, with five discussion leaders, each of whom presented a short talk or paper, followed by a question and answer period. Discussion leaders were:

Chas. O. Burgess, Union Carbide & Carbon Corp., Niagara Falls, N. Y., on alloys.

M. W. Pohlman, Pohlman Foundry Co., Inc., Buffalo, on cast iron.

John C. McCallum, McCallum-Hatch Bronze Co., Inc., Buffalo, on the problems of non-ferrous.

Jas. A. Lansing, Malleable Founders' Society, Cleveland, on malleable iron, substituting for F. J. Wurscher, Acme Steel & Malleable Iron Co., Buffalo, who was absent due to illness.

T. W. O'Hara, Symington Gould Corp., Depew, N. Y., on steel, substituting for D. Murphy of the same firm.

These Production Clinics are being held for the purpose of exchanging information on production problems involved in war work. They are serving an excellent purpose. All chapters are urged to take an active part in the program when such clinics are held within their respective areas. Participation in the clinics, in most instances, has been under the Chapter War Problems Committee.

Crane Tech Junior Group Holds Dinner

THE Chicago Crane Technical High School Section of the Junior Foundrymen of America held its annual graduation dinner at Little Jack's Restaurant, Chicago, recently. This dinner is held to honor the graduates in foundry practice at the high school, the graduates operating under the Smith-Hughes Act by which a majority of the time spent in school is in actual foundry operations.

The dinner was addressed by L. F. Lottier, Peoples Gas Light & Coke Co., Chicago, on the broad aspects of the metal working industries, while N. F. Hindle, Assistant Secretary, American Foundrymen's Association, spoke on the part that the trained foundrymen must play in the war effort.

New officers of the Crane Section of the Junior Foundrymen of America are as follows: *President,* Eugene Kozlowski; *Vice-President,* Joseph DiGiorgio; *Secretary,* George Norkus; *Treasurer,* John Frontera; *Sargeant-at-Arms,* Tony Tavicchio.

All members of the graduating class already have been placed in foundries of the Chicago area.

Army-Navy Award to Acme Pattern & Tool

FOR its excellent record in turning out heat treated aluminum castings for aircraft, Acme Pattern & Tool Co., Dayton, Ohio, has been awarded the joint Army-Navy "E." Ceremonies were held at the company's plant February 16, when presentation was made by Brig. Gen. A. E. Jones, chief of Procurement Division, Army Air Forces, Wright Field.

The Acme firm, members of A.F.A. since 1936, was originally founded by Karl A. Stein, president, as a pattern shop, later adding aluminum castings, foundry supplies and tools and dies. Mr. Stein's son, R. J. Stein, is vice-president.

National Honored for Safety and War Work

HAVING won the James B. Clow & Sons Safety Trophy for five consecutive years, permanent possession was awarded the National Cast Iron Pipe Co., Birmingham, Ala., at a plant meeting February 6, in Tarrant City, suburb of Birmingham. At the same meeting, the War Department presented a

IMPORTANT!

Mailing Date of Big April Issue

ATTENTION of A.F.A. is called to the fact that the big April Pre-Convention issue of "American Foundryman" will be mailed the early part of April, so as to be in the hands of all early in the week of April 12th. This later mailing date has been decided upon so that issue may contain the complete program of the 2nd War Production Foundry Congress, to be held in St. Louis on April 28-30.

By all odds, the April issue will be the finest ever published by the Association, entirely *different* in every way. It will contain complete information on the Congress, important messages from leaders of the Foundry Industry, special technical material, and . . . a most extensive Advertising section, the first time such a section has ever been included in any regular publication of the Association.

Watch for the April Pre-Convention Issue!

service flag to the company in recognition of its excellent work in the production of 155 mm. shells.

C. J. Day, vice-president, James B. Clow & Sons, parent company of the National organization, told of the part that safety work must play in winning the war. He urged employees to maintain their splendid safety record, believed to be one of the best in the history of the country.

Prior to September, 1942, the National plant operated 1,873 days without a single lost-time accident. Since then three employees have reported lost time through accidents, marring an otherwise perfect record, but not denying them the trophy.

Chicago Museum of Science and Industry Goes to War

J. R. Van Pelt,* Chicago, Ill.

THE Museum of Science and Industry in Jackson Park, Chicago, instructs and entertains a million persons each year. Today these visitors are interested first in the war, and the Museum foundry, along with all its other exhibits, is doing its part in the war effort.

The Museum's thousands of operating exhibits illustrate scientific principles and their application to industrial processes, not only to the casual visitor but also to civilian war workers and to the armed forces. Among those who have been making daily visits to the Museum are sailors from the Naval Training School at Chicago's Navy Pier, who come to the Museum in sections of 30 men each day.

These men are training to be aviation machinist mates and it is important that they acquire a working knowledge of metals. Their 2-hour daily visit to the Museum acquaints them with equipment and processes that most of them will use in training and in active service.

A.F.A. Cooperation

The Naval Training School realizes the potential value of the Museum's facilities and it was through their Educational Department that the sailors' tours were arranged. The daily visits are considered as a part of the school's indoctrination program.

The Museum's modern gray iron foundry, installed through cooperation of the Chicago chapter of the American Foundrymen's Association and the industry it represents, is a "must" on the sailors' tours. Standing on raised platforms at the glass-enclosed foundry, where they can see every motion and hear through a modern public address system, they receive an explanation of the metal casting process from beginning to end. They watch and listen as the foundry crew shows how patterns are made, sand is prepared, and molding machines operated.

Then there follows a step-by-step explanation of electric furnace operations—charging and bringing of the charge to heat. As attention is focused on the furnace the demonstrator explains how the ladle is handled and the furnace tilted and poured. The cupola, standing next to the electric furnace, is similarly explained.

Complete Casting Shown

The audience watches attentively as the ladle is guided to the long row of molds which are ready to be poured in rapid succession. After the pouring the shaking-out, tumbling and blasting of the castings is demonstrated.

Many different types of molds and cores are illustrated by cutaway displays. Attention is drawn to a series of comprehensive charts of malleable, gray iron and cast steel industries, and the widespread use of foundry products throughout industry is pointed out. Specialties such as centrifugal casting, and the related field of die casting, also receive consideration.

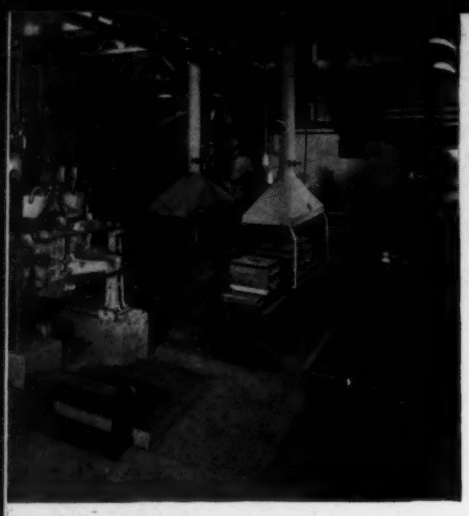
Perhaps in no other foundry in the world do visitors receive a "blow-by-blow" description of the whole operation as it takes place. The loud speaker system, together with the plate glass partition and carefully prepared lectures, makes this possible.

An Excellent "Short Course"

Even though the Museum's financial limitations have made necessary a "still" demonstration, at its conclusion the alert spectator has acquired more actual knowledge of the metal cast-

*Technical Director, Museum of Science and Industry.

Gray iron for the Navy? Sailors observing foundry practice at Museum of Science and Industry, Chicago, watch pouring operations.



The foundry exhibit at the Museum of Science and Industry is a constant magnet for large crowds.

ing process than could be absorbed in days of reading and study. In addition he has the opportunity to ask pertinent questions. This demonstration of the Museum foundry constitutes a valuable addition to the education of these Navy men and to the other groups of technical students since it provides a condensed picture of extensive operations.

Navy Pier trainees are among the most interested and enthusiastic of the Museum's visitors. Their routine 2-hour trip apparently does not completely satisfy their individual appetites, as many of them return during their week-end liberty and invariably turn up at the foundry to witness the actual operations.

The Service Men and other groups of technical students realize the educational value of the exhibits offered at the Museum of Science and Industry. They express their enthusiasm and keen appreciation that such material is made available to them. By such means, the Museum staff is making an invaluable contribution to the war effort. It hopes that, through the intensified use of its facilities, it can be of even greater assistance to those who are preparing to be of service to their country, whether they are in the Armed Forces or in war production.

Caterpillar Presents Diplomas to Craftsmen

ON JANUARY 17 the Caterpillar Tractor Co., Peoria, Ill., held a graduation dinner for those apprentices who have completed their courses and now have assumed a place in the organization as masters of their craft. Diplomas for the 4-year Foundryman Course were presented to Frank Hamlin, Joe Isoardi and John C. Welch. Diplomas for completion of the 4-year Patternmaker Course were presented to Jacob Meier, Robert Miller and Clift J. Winkenhauser, the latter being on military leave. Diplomas were presented by M. J. Gregory, Factory Manager of Caterpillar and a Director of A.F.A.

Wisconsin War Problems Group Discusses Women in Industry

ON JANUARY 15 a meeting of the Wisconsin Chapter War Problems Committee was held in Hotel Schroeder, Milwaukee. The committee, under the chairmanship of W. J. MacNeill, President, Federal Malleable Co., Milwaukee, has the task of solving problems, resulting from present conditions, for foundries throughout the state that might seriously retard production of essential war materials. The committee is composed of representatives of the leading war production industries of the state.

The problem discussed at this meeting is one of the most critical which the industry faces, namely, manpower. Because of the critical manpower situation, which threatens the production of war goods, the committee has conducted an extensive study on the possibility of women replacing men in making castings for various war purposes, such as for ordnance, tanks, armament, and Navy parts.

Women Doing Men's Work

Addressing the meeting on the industrial hygiene angle of the problem, Dr. Paul A. Brehm, Director, Industrial Hygiene Division, Wisconsin State Board of Health, said: "Of necessity industry is forced to accept the fact that women now have to do the work of men in most plants. Management and its superintendents and foremen will have to change their former ideas on this subject. In certain skilled jobs, women, who previously were thought to be ineligible, are now producing at a greater rate than men. They take great patriotic pride in their work."

Dr. Brehm declared it was not necessary for women in industry to submit to physical or medical examinations more often than once a year, the same as has been the practice for male workers. However, he strongly cautioned that women replacing men in industry should be compelled to promptly inform management of prospective motherhood. Prospective mothers could work with reasonable safety, he said, through six months of prospective motherhood, while those engaged exclusively at desk jobs could work through the eighth month.

An Industry Necessity

In commenting upon the employment of women, Dr. Stewart Scrimshaw, Associate Dean, College of Business Administration, Marquette University, declared the employment of women in industry to be an absolute necessity because of the lack of young men for such training.

Dr. Scrimshaw also stated, "It is not necessary to obtain women to teach such women replacements, although women supervisors might prove beneficial in many instances. Women will accept teaching and training from men if they recognize that the men know their business. Women can easily be taught to do the most skilled jobs. They are now trained to grind tools and to do other skilled work that formerly only men were believed to be capable of."

Dr. Scrimshaw said that he had recently conducted a group of women through a foundry and was surprised at the highly intelligent questions they asked. He said his experience had been that foremen and supervisors, who formerly opposed women in

industry, were now enthusiastic over the fine work these women were doing in their shops.

Women Keenly Patriotic

"It is strictly a psychological problem," he said. "Years ago it was found impossible to induce American born boys to accept training or work in foundries. They felt it to be work for foreigners with less scholastic training and advantages than they had enjoyed. Of recent years, American born youth has been going into foundries for training and work since they discovered that their fellow workmen spoke just as correctly and enjoyed the same training and experience. Women in like manner will now accept work in the foundries, and they will experience a keen sense of patriotism in doing it."

He recommended that women should not work over eight hours or on late shift, whenever the latter was practicable. He suggested they be compelled to wear proper protective garments, especially for the hair, be given adequate mechanized equipment to make the work as easy as possible, and provided with satisfactory sanitary facilities and rest rooms. In addition to the customary lunch period, he recommended occasional short rest periods.

Proper Training Vital

"Adequate training for women entering industry cannot be too strongly urged," he declared. "While it has been suggested that women should not be expected to lift, often they are called upon to lift more in their ordinary household duties. However, it is strictly a question of providing women with proper and sufficient training as to how to lift properly and to request assistance if a woman finds she cannot handle a job."

The committee's conclusions after careful surveys were that women cannot be confined to one particular shift, but would have to be distributed throughout the customary three shifts.

The pouring of molten metal, except in cases of hand ladle pouring, where greater strength is required, should not prove more hazardous for women than for men, the committee found. In mechanized pouring of iron, the committee concluded, women would possibly be more alert and thus equally as satisfactory, if not in some instances better, than men, if adequately trained, supervised and clothed.

Jobs for which women could be employed in the foundries included bench and squeezer molding, with men to carry away the molds, core making, the operation of mechanized sand mixers, straightening presses, drop hammers and other mechanized equipment.

It was pointed out that for years women have been employed as core makers in foundries and that, during World War I, when foundries were not as mechanized as they are today, many women did very satisfactory work on other jobs in foundries.

Birmingham Group Holds 11th Annual Regional Conference

OUTSTANDING foundrymen from many parts of the country attended the 11th Annual Foundry Practice Conference sponsored by the Birmingham District Chapter of A.F.A., held February 19 at the Tutwiler Hotel, Birmingham, Ala. Papers presented made direct contributions to the work of Southern foundries in war production, according to a report by Chapter Secretary-Treasurer Howard A. Nelson, Hill & Griffith Co., Birmingham.

David L. Booker, National Cast Iron Pipe Co., Birmingham, opened the conference at the afternoon session, acting as discussion leader. This meeting was featured by a paper on "The Role of Iron and Steel Castings in Ordnance Materials," presented by Capt. Robt. W. Sandelin, Birmingham Ordnance District.

The discussion on refractories was presided over by Chas. K. Donoho, American Cast Iron Pipe Co., Birmingham. An interesting paper was offered at this group by R. A. Barr, Carborundum Company, Niagara Falls, N. Y., on "Research and Development of High-Grade Refractories."

Another outstanding paper was presented by W. D. Moore, American Cast Iron Pipe Co., on the problems involved in "Conversion from Work Production to War Production." W. E. Jones, Stockham Pipe Fittings Co., Birmingham, led the discussion that followed this paper.

The regional conference was climaxed by the annual banquet, at which E. A. Thomas, Thomas Foundries, Inc., Birmingham, and president of the Birmingham A.F.A. chapter, presided. Warren Whitney, National Cast Irop Pipe Co., acted as toastmaster. L. N. Shannon, Stockham Pipe Fittings Co., introduced the guest speaker, E. L. Shaner, president, Penton Publishing Co., Cleveland, who spoke on the foundry role in 1943.

Changes in American Brake Shoe Personnel

THE American Brake Shoe and Foundry Co., with headquarters at 230 Park Ave., New York, has announced the appointment of Horace A. Deane

Horace A. Deane

as works manager, Brake Shoe and Castings Division. Mr. Deane, who succeeds W. Scott Fraula, joined the staff of American Brake Shoe in August, 1939 as assistant works manager, Brake Shoe and Castings Division. He formerly was employed by Deere & Co., Moline, Ill.

Mr. Deane has been active in the affairs of the American

W. Scott Fraula

Foundrymen's Association for many years, and actively participated in the work of the Quad City Chapter and, more recently, the Metropolitan Chapter. He has also presented several papers on various phases of foundry practice before the annual meetings of the Association and has contributed articles of a similar character to the trade and technical press.

Mr. Fraula has been operating assistant to the president of the American Brake Shoe since August 1, 1942, as well as works manager of the Brake Shoe and Castings Division. His success is a typical American Odyssey. Beginning as an apprentice in that division in 1921, he worked in several plants of the company, in 1924 becoming general foreman and in 1929 assistant superintendent of the Mahwah N. J., plant.

In 1931 he was made assistant general superintendent of all plants of the division, and in 1938 became works manager of the Brake Shoe and Castings Division, a position he has since held until now relinquishing it to devote his entire time as operating assistant to the president. Mr. Fraula also has been active in the work of A.F.A., particularly in the work of the Metropolitan Chapter.

U. S. Wants Answers To Wartime Problems

IN THE January issue of *American Foundryman*, a number of wartime problems were listed for which the Government wants solutions. The list was released by the Associated Defense Committee of Chicago Technical Societies, of which the Chicago Chapter of A.F.A. is a member.

This committee is working closely with the local WPB, Army and Navy Ordnance, and the local OCD. Members of A.F.A. desiring to offer solutions to such problems, another list of which is printed below, should send them to Robert C. Brown, Jr., Chairman, Associated Defense Committee of the Chicago Technical Societies, 205 W. Wacker Drive, Chicago, Ill.

Aeronautics

A-3. Controls for big airplanes. (Cable controls not only have slack but the take-up of sag stores energy, producing an effect known as "rubber." Provision of small "tabs" at control surfaces helps for high ship speed, but is very poor for low ship speed.)

A-5. Means for reducing landing speeds of military planes.

A-8. Devices for facilitating night landings.

A-11. Improved wing and propeller de-icer or preventer.

A-16. A skin (wing surface) that will not "oil-can."

A-17. Constant speed propellers.

Chemical and Metallurgical

A-19. High-powered explosives and destructive chemical compositions.

A-20. Explosives made from liquid or vapor hydrocarbons.

Engines

A-23. Gasoline injection equipments for internal combustion engines, especially to replace carburetors.

A-27. A lubricating system to improve aircraft engine lubrication during power dives.

Guns and Sights

A-30. Improved gun sights, optical or otherwise.

A-34. Guns operated by air, centrifugal and electromagnetic applications.

War Machines

A-37. Remote controlled aerial, marine and land torpedoes; combat weapons in general.

A-38. Automatic mines for land and sea.

Miscellaneous

A-42. Detection devices for locating objects by heat, radiant energy, sound or other methods.

A-44. Special equipment to simplify servicing of motor vehicles and aircraft, and improved motorized repair shop equipment.

A-52. Traffic control equipment.

A-56. Non-chatter hydraulic valves of all kinds.

Ideas forwarded to the committee become confidential material, and those submitting possible solutions should not expect to hear whether or not they have been accepted.

New Committee Members

Brass & Bronze Division

Subcommittee on Silicon Bronzes—Recommended Practices Committee—

S. A. Weigand, Met., The Lunkenheimer Co., Cincinnati.

Aluminum & Magnesium Division

Advisory Committee—

Dr. Robert Thomson, Met., Dodge - Chicago Plant, Chrysler Corp., Chicago.

General Interest Committees

Industrial Hygiene Codes Committee—

R. B. Parker, Safety Supv., American Brake Shoe and Foundry Co., New York.

Committees of Board of Directors

Subcommittee on Foundry Practice — Alloy Cast Irons Book Revision Committee—

F. J. Walls, Met., Chairman, International Nickel Co., Detroit.

Foundry Sand Research Committee

Subcommittee on Grading and Fineness:

Dr. H. Ries, Chairman, 401 Thurston Ave., Ithaca, N. Y.

D. H. Rishor, Fdry. Consultant, George F. Pettinos, Inc., Rochester, N. Y.

Subcommittee on Physical Properties of Steel Foundry Sands at Elevated Temperatures:

F. B. Riggan, Met., Key Company, East St. Louis, Ill.

H. F. Taylor, Sr. Met., Naval Research Laboratory, Anacostia Station, Washington, D. C.

J. W. Juppenlatz, Chief Met., Lebanon Steel Foundry, Lebanon, Pa.

The Children's Bureau, United States Department of Labor, is setting up a series of advisory standards pointing out the hazards of various occupations in which young workers are likely to be employed and listing safe or unsafe work for boys and girls 16 and 17 years of age.

Government Orders of the Day for Industry

More detailed information on any of the following news briefs may be obtained by writing direct to the U. S. Information Center, 1400 Pennsylvania Ave., N.W., Washington, D. C. For prompt reply, it is suggested that requests be made by Release numbers shown.

Vital Metals Sales Control (WPB)—CMP Reg. 4, to govern sales of aluminum, copper and steel by warehouse and distribution, issued eff. Feb. 15 for copper, March 31 for aluminum and steel. *(Release No. WPB-2465)*

Provo Pig Iron Base (OPA)—For basic pig iron to be sold commercially from Provo, Utah, OPA established eff. Feb. 1 a basing point base price of $21.50 per gross ton, through Amend. 4 to RPS-10. *(Release No. OPA-T-525)*

Cast Iron Boilers (WPB)—Restrictions on low-pressure cast iron boilers under Limitation Order L-187, relaxed to permit manufacture for war housing, civilian replacements, and military and hospital needs, by order amended Jan. 27, by Dir. Gen. for Operations. *(Release No. WPB-T-1661)*

Boiler Iron & Steel (WPB)—Quotas of iron and steel for low-pressure cast iron boilers for war housing and civilian replacement increased for first half 1943, by amend. of Order L-187, Feb. 13. *(Release No. WPB-2532)*

Steel for Farm Machinery (WPB)—A 50,000 ton increase in steel during 1st quarter for manufacture of farm machinery was included in Dept. of Agriculture's program, announced Jan. 21. *(Release No. WPB-2388)*

Brass, Bronze Alloy Ceilings (OPA)—Maximum prices set for four new ranges of brass and bronze alloy ingot, impurities limitations of two others increased, and maximum price method simplified for special brass and bronze alloy ingots, under Amend 2. to MPR-202, eff. Feb. 1. *(Release No. OPA-T-539)*

Conserving Ferrochrome (WPB)—Because of limited ferrochrome supplies, increased use of scrap and chrome ore for stainless steel ordered Feb. 13 by Dir. Gen. for Operations. *(Release No. WPB-2520)*

Ferrochromium Packaging (OPA)—Packaging differentials may be added to maximum price of ferrochromium when packed for carlot shipment, also when shipped to U. S. Govt. Procurement agencies in special containers, under Amend. 107 to SR-14, eff. Feb. 16. *(Release No. OPA-T-570)*

Cut Virgin Magnesium Price (OPA)—Maximum base prices of virgin magnesium metal ingot and primary alloys reduced 2c lb. by OPA under MPR-314, eff. Feb. 1. *(Release No. OPA-T-547)*

New Fluorspar Producers (WPB)—Five new producers of metallurgical grade fluorspar expected to come into production in 1943, adding another 60,000 tons of this critical material to supply, revealed Jan. 19 at meeting of Fluorspar Producers Industry Advisory Committee in Washington. *(Release No. WPB-2392)*

Oxygen, Calcium Carbide Shortages (WPB)—Shortages of both oxygen and calcium carbide anticipated early this year, members of Oxygen and Acetylene Industry Advisory Committee informed at Washington meeting. *(Release No. WPB-T-1641)*

Platinum Ceilings (OPA)—Maximum prices for six platinum metals set by OPA in dollars and cents at levels existing during 1st quarter 1942, through MPR-309, eff. Feb. 1. *(Release No. OPA-T-523)*

Wood, Coal Stove Output (WPB)—Unrestricted use of iron and steel for coal and wood burning heating stoves permitted during Feb. and March, under Supp. Limitation Order L-23-d, amended Jan. 29. *(Release No. WPB-2426)*

Coal Stoves Available (OPA)—Rationed coal stoves made available for supplementary heat for families with central oil-heating systems but insufficient oil, under Amend. 1 to RO-9, eff. Jan. 29. *(Release No. OPA-1586)*

Materials for Transit Program (WPB)—Critical materials required in constructing equipment in transit industry program 1943 to be made available under policy decision of WPB Requirements Committee, announced Jan. 26. *(Release No. WPB-T-1657)*

Pipe Fittings to Valve Section (WPB)—Sched. II of Limitation Order L-42 on simplification of gray iron, malleable iron, brass and bronze pipe fittings, transferred to Valve and Fittings Section, announced Feb. 5 by Chief of Section W. W. Snyder. *(Release No. WPB-2459)*

Simplify Valve Models (WPB)—The number of gate, globe, angle, cross, and check valve types reduced from 4,079 to 2,504 by Limitation Order L-252, effective Jan. 23. *(Release No. WPB-T-1635)*

Elevator Control (WPB)—Closer control over manufacture of elevators and elevator parts, equipment or accessories established by Gen. Cons. Order L-89, amended Jan. 29. *(Release No. WPB-T-1675)*

Plastic Machinery Allocated (WPB)—Plastics molding machinery placed under allocation Jan. 29 through Allocation Order L-159. *(Release No. WPB-T-1682)*

FOR VICTORY TODAY AND SOUND BUSINESS TOMORROW

Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business.* It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are making a definite contribution to Victory . . . by helping to buy guns, tanks, and planes that America and her allies *must* have to win. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month, can buy when the war ends!

For Victory today . . . and prosperity *tomorrow*, keep the War Bond Pay-Roll Savings Plan rolling in *your* firm. Get that flag flying now! For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

EVERYBODY EVERY PAYDAY 10%

SAVE WITH **War Savings Bonds**

New Members

A.F.A. takes pleasure in listing below the names of 101 progressive foundries and foundrymen added to the Association membership rolls during the month ending February 15. Here is real evidence of the great work being done by Chapter membership committees, particularly since the total includes 16 Company Members. Leading the list in new members added is the Quad City Chapter, with 15 new supporters of A.F.A. activities. Welcome, New Members! This Association is your Association . . . take an active part in its affairs and your investment will pay real dividends.

(January 16 to February 15, 1943)

Birmingham District Chapter

T. W. Blackwell, U. S. Pipe & Foundry Co., Birmingham.
F. W. Knoth, Fdry Executive, Dixie Bronze Co., Birmingham.

Central New York Chapter

John J. Mahoney, Sales Mgr., Seneca Foundry Co., Geneva, N. Y.

Chesapeake Chapter

Hans Warffemius, Appr. Molder, U. S. Naval Gun Factory, Washington, D. C.

Chicago Chapter

*Atlantic Chemicals & Metals Co., Chicago. (S. Heinsfurter, Partner)
*David Bradley Mfg. Works, Bradley, Ill. (Cecil Crawford, Met.)
Thomas Gregg Bryans, Tech. Repr., Hercules Powder Co., Chicago.
Frank Fones, Whiting Corporation, Harvey, Ill.
W. J. Freyer, American Steel Foundries, East Chicago, Ind.
*Hodgson Foundry Company, Chicago. (John K. Hodgson, Sec'y.)
Gus V. Mikalauski, American Steel Foundries, East Chicago.
J. R. Nicholas, Partner, Miller & Company, Chicago.
M. K. Schrock, Hydro-Blast Corp., Chicago.
Burton Strauss, Partner, Atlantic Chemicals & Metals Co., Chicago.
Edgar Bartlett Williams, Core Room Foreman, American Steel Foundries, East Chicago.

Cincinnati District Chapter

Leonard Gudorf, The Minster Machine Co., Minster, Ohio.
Frank H. Beckman, The Minster Machine Co., Minster.
John M. Kane, Engr., American Air Filter Co., Louisville, Ky.
John Kudrick, Supv., Wright Aeronautical Corp., Lockland, Ohio.
Ray Kuhn, The Minster Machine Co., Minster.
*Chas. Taylor Sons Company, Cincinnati. (R. W. Knauft, Sales Mgr.)

Detroit Chapter

*Albion Malleable Iron Co., Albion, Mich. (Thomas T. Lloyd, Vice-Pres.)
B. P. Anderson, Sales Engr., National Foundry Sand Co., Detroit.
J. H. Bondie, Ass't Supt., Budd Wheel Co., Detroit.
John D. Cannon, Chief of Inspection, Magnesium & Aluminum Foundries Ford Motor Co., Aircraft Div., Dearborn, Mich.
LaMar D. Creeger, Met., Budd Wheel Co., Detroit.
William Czygan, Chemist, Budd Wheel Co., Detroit.
*Detroit Brass & Malleable Works, Wyandotte, Mich. (O. H. Melke, Plant Mgr.)
Frank H. Eager, Gen'l Fdry Foreman, Pontiac Motor Division, Pontiac, Mich.
C. H. Kinsman, Prod. Mgr., Detroit Brass & Malleable Works, Wyandotte.
Rudolph Nuske, Fdry Foreman, Budd Wheel Co., Detroit.
Racine Ripley, Detroit Alloy Steel Co., Detroit.

Eastern Canada and Newfoundland Chapter

Jos. Daoust, Coremaker, Robert Mitchell Co., Ltd., St. Laurent, Que.
H. E. Rochon, Mgr., M. I. Viau & Fils, Ltee., St. Jerome, Que.
Edward F. Vincent, Mgr., Refractories Dept., LaSalle Builders Supply Ltd., Montreal.

Metropolitan Chapter

Donald P. Falconer, F. E. Schundler & Co., Long Island City, N. Y.
Charles Rosenberg, Fdry Tech., Wright Aeronautical Corp., Paterson, N. J.
*U. S. Metals Refining Co., Carteret, N. J. (Alfred Sugar, Aluminum Div.)

Northern California Chapter

Emil A. Anderson, Patt. Shop Foreman, Enterprise Engine & Foundry Co., San Francisco.
Donald C. Caudron, Prod. Supt., Pacific Brass Foundry of San Francisco, San Francisco.
Earl L. Friend, Enterprise Engine & Foundry Co.
Charles Hoehn, Jr., Asst. to President, Enterprise Engine & Foundry Co., San Francisco.
Robert L. Lambert, Patt. Supv., General Metals Corp., Oakland, Calif.
George W. Stewart, Fdry. Supt., Pacific Brass Foundry of San Francisco, San Francisco.
Frank J. Taforo, Jr., Sales Engr., Van Arsdale-Harris Co., San Francisco.

Northeastern Ohio Chapter

Arthur J. Forro, Foreman Sand Control, National Aluminum Cylinder Head Co., Cleveland.
Ernest F. Kindt, Kindt-Collins Company, Cleveland.
Paul G. Weineck, Kindt-Collins Company, Cleveland.
Ralph Whaling, Kindt-Collins Company, Cleveland.

Ontario Chapter

John McL. Allan, Iron Fdry. Foreman, Otis-Fensom Elevator Co., Ltd., Hamilton, Ont.
*Belleville Foundries Limited, Belleville, Ont. (H. L. Willing, Mgr.)
*The Brown Boggs Foundry & Machine Co., Ltd., Hamilton. (John Morrison, Fdry. Supt.)
Walter Hewitt, Brass Fdry. Foreman, Otis-Fensom Elevator Co., Ltd., Hamilton.
S. Malpass, Brass Fdry. Foreman, Otis-Fensom Elevator Co., Ltd., Hamilton.
Chas. A. Thompson, Galt Malleable Iron Co., Galt.
James Walton, Core Room Foreman, Otis-Fensom Elevator Co., Ltd., Hamilton.

Philadelphia Chapter

William John Berghaier, Patternmaker, Dodge Steel Co., Philadelphia.
*Fischer & Porter Company, Hatboro, Pa. (John Breen, Patt. & Cast. Supv.)

Quad-City Chapter

Burton L. Bevis, Sand Control, Caterpillar Tractor Co., East Peoria, Ill.
Walter M. Carpenter, Sand Control Foreman, Ordnance Steel Foundry Co., Bettendorf, Iowa.
William Alfred Cavanagh, Coremaker, Ordnance Steel Foundry Co., Bettendorf.
R. E. Canfield, Fdry. Molding Room Foreman, Ordnance Steel Foundry Co., Bettendorf.
M. H. Hammett, Equip. Dept., Ordnance Steel Foundry Co., Bettendorf.
James A. Johnson, Core Room Foreman, Ordnance Steel Foundry Co., Bettendorf.
V. B. Koprucki, Fdry. Foreman, Ordnance Steel Foundry Co., Bettendorf.
Russell J. Korty, Chemist, Caterpillar Tractor Co., East Peoria.
W. H. Larrance, Gen'l Foreman, Ordnance Steel Foundry Co., Bettendorf.
B. Mathias, Ass't Foreman, Ordnance Steel Foundry Co., Bettendorf.

*Company members.

L. G. McGill, Molding Room Foreman, Ordnance Steel Foundry Co., Bettendorf.
Joe McLean, Ass't Chief Inspector, Ordnance Steel Foundry Co., Bettendorf.
Arthur W. Miller, Foreman, Ordnance Steel Foundry Co., Bettendorf.
Joseph L. Oberle, Caterpillar Tractor Co., Peoria, Ill.
Harold A. Rasmussen, Patt. Shop Foreman, Ordnance Steel Foundry Co., Bettendorf.

St. Louis District Chapter

William M. Baxter, Plant Met., National Bearing Metals Corp., St. Louis, Mo.
H. B. Lockwood, Fdry. Mgr., Willard Storage Battery Co., Dallas, Texas.
James Stuart, General Steel Castings Corp., Granite City, Ill.

Southern California Chapter

*Clarke Steel, Inc., Los Angeles. (Harold D. Rice, Ass't Mgr.)
*Haberfelde Steel Co., Bakersfield, Calif.
George Livelsberger, Foreman, Haberfelde Steel Co., Bakersfield.
Walter G. Lohwasser, Prop., Star Brass Foundry, Los Angeles.
Robt. S. Miller, Enterprise Iron Works, Los Angeles.
H. C. Mitchell, Core Room Foreman, Magnesium Products Co., Los Angeles.
Wilbur A. Saylor, Div. Supt. of Steel Prod., Kaiser, Inc., Iron & Steel Div., Fontana, Calif.
J. W. Struve, Vice-Pres., Rich Manufacturing Co., Los Angeles.

Twin-City Chapter

Robert C. Garwood, Minneapolis, Minn., Sales Engr., Modern Equipment Co., Port Washington, Wis.

Western New York Chapter

Ralph B. Benz, Power & Heating Bureau, Buffalo Niagara Electric Corp., Buffalo.
Barney Gates, Williamsport, Pa., Kindt-Collins Company, Cleveland, Ohio.
Joseph Kaufer, Supt., Tanner Manufacturing Co., Erie, Pa.
Rodney Sheffield, Met., Bovaird & Seyfang Mfg. Co., Bradford, Pa.
*Tanner Manufacturing Company, Erie, Pa. (Theodore L. Bauer, Sec'y-Treas.)

Wisconsin Chapter

*Grossman Brothers Company, Milwaukee. (A. G. Whaley, Vice-Pres.)
James Meiers, Allis-Chalmers Manufacturing Co., West Allis, Wis.
Herman J. Ollenburg, Core Room Foreman, The Vilter Manufacturing Co., Milwaukee.
Matthew Pintar, Allis-Chalmers Manufacturing Co., Milwaukee.
George A. Stolze, Appr., Allis-Chalmers Manufacturing Co., Milwaukee.
John Henry Ullstrup, Patt. Shop Foreman, The Vilter Manufacturing Co., Milwaukee.
Kenneth Yonker, Appr., Allis-Chalmers Manufacturing Co., Milwaukee.

Outside of Chapter

Wm. L. Doyle, Melting Supt., Fort Pitt Steel Casting Co., McKeesport, Pa.
*Jessop Steel Company, Washington, Pa. (Robert K. Kulp, Director of Research)
Edward A. Kreller, Fdry. Supt., Jessop Steel Company, Washington, Pa.
*Tampa Shipbuilding, Inc., Tampa, Fla. (T. B. Mason, Mgr., Hydraulic Division)

Northeastern Ohio Active in Broad Foundry Training Work

PRACTICALLY all A.F.A. chapters have shown greatly increased interest in the training of foundry workers during recent months, due to manpower problems associated with war production. In several instances, chapters have sponsored and organized evening courses for apprentices and other employees. Notable are the courses sponsored by the Chicago, Wisconsin and Birmingham chapters.

Another chapter that has done splendid work in the training field is the Northeastern Ohio Chapter. While not actually holding evening courses, this chapter has cooperated closely with the Cleveland Trade School, Cleveland, in a unique arrangement that provides facilities for the most practical kind of foundry training.

How Courses Agreed On

During the past 12 years, the foundry and patternmaking departments of the Cleveland Trade School have set up courses specifically for young foundrymen. Courses cover all phases of foundry and pattern shop operation, including foreman training, the content of each course being agreed upon by a committee composed of members of the Northeastern Ohio Chapter of A.F.A.

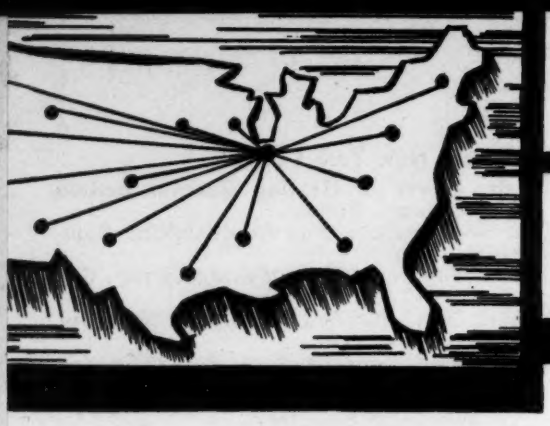
Publicity is given the courses at almost every meeting of the chapter, and many foundries in the chapter district have sent picked men to attend the classes. For example, in one foreman training class are 21 men from Cleveland foundries active in affairs of the Association chapter.

Practical Subjects Taught

Among the subjects covered, according to Jas. G. Goldie, foundry instructor at the school, and vice-president of the Northeastern Ohio chapter, and Frank C. Cech, head of the pattern division, are practical bench and floor molding, core making, cupola practice, also practical beginning, elementary and advanced patternmaking, blueprint reading, etc. One of the features of the Foundry and Allied Industry Exhibit at the 1942 A.F.A. convention, it will be recalled, was the interesting exhibit of the Cleveland Trade School, where students demonstrated their abilities in patternmaking and molding.

Interest of the Northeastern Ohio chapter in training has been shown in many other ways also. Each year apprentices from chapter foundries are entered in the A.F.A. Apprentice Contest as a chapter group, and the chapter later awards its own prizes not only to chapter winners, but also to all who enter the national contest. Further recognition is given those foundries in the district whose apprentices win places in the local run-off contests. Few, if any, chapters go to such pains to build up enthusiasm in the A.F.A. apprentice contests as does the Northeastern Ohio chapter.

A new Corrosion Division has been formed by the Electrochemical Society, to coordinate interests of the Society with others particularly interested and active in the field. Papers will be solicited.



Chapter Activities

Cincinnati A.F.A. and A.S.M. Chapters Hold Joint Meeting

By Henry M. Wood,* Cincinnati, Ohio

MEMBERS of the Cincinnati Chapter of A.F.A. held their regular monthly meeting jointly with the local chapter of the American Society of Metals on February 8, at the Cincinnati Club. Sixty attended the dinner, 100 the meeting that followed, with A.F.A. Chapter Chairman Frank Hutchinson, Reliance Foundry Co., Cincinnati, presiding.

Chairman Hutchinson called upon W. M. Ball, Edna Brass Mfg. Co., Cincinnati, past chairman of the A.F.A. chapter and present chairman of the A.S.M. chapter, to introduce the A.S.M. members present. Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill., and president of A.F.A., then was presented and offered interesting data information on the 1943 War Production Foundry Congress scheduled for St. Louis in April.

Ed H. King, Hill & Griffith Co., Cincinnati, announced an important special extra meeting of the A.F.A. chapter on February 10, in the nature of a Regional O.P.A. Clinic. Mr. King then introduced the guest speaker, Thomas Barlow, Vanadium Corp. of America, Detroit, who presented valuable data on "Materials Substitutions."

Mr. Barlow first took up substitutions as applied to basic metal practice, and then discussed castings design as to cross-sections, the application of cast metals, chemical analysis of alloys, and inoculation with ladle additions. Substitutions that are undertaken because of shortages of critical metals, he stated, frequently have worked out better than the original alloys, and various examples were cited to prove the point.

Dr. Smith of A.S.M. led the discussion that followed Mr. Barlow's talk, a large number and variety of questions reflecting the interest of the audience.

*W. W. Sly Mfg. Co., and Secretary of the Cincinnati Chapter.

Chicago Chapter foundrymen at their February 1st meeting. Top—Axel Christiansen, Christiansen & Olsen Foundry Co., entertains in dialect. Bottom—Guest speaker Wally E. George, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich., refers to notes.

Safety Is Subject of Chicago Chapter

WALLY E. GEORGE, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich., addressed the February 1 meeting of the Chicago Chapter, held in the Chicago Bar Association, on "Plant Protection, Safety and Good Housekeeping." In regard to his company's safety program, Mr. George stated that it had more than paid for itself as it had lowered the insurance rate by nearly 50 per cent.

He also emphasized the importance of measures to combat absenteeism. At his company, absenteeism ranges from 3 to 18 per cent. All absentees are checked daily by a visiting nurse

to render them service in case of illness. The three major factors involved in absenteeism are: (1) Labor pirating, (2) looking for other jobs, and (3) too much money so that they do not care to work every day.

A point of particular importance, in relation to employee health, was brought out by the speaker when he mentioned a new contagious eye disease known as keratoconjunctivitis. This disease, in several portions of the country, has reached epidemic-threatening proportions, and considerable study has been devoted to methods of combating it. According to Mr. George, the disease in one stage resembles "pink eye," but is more serious and more difficult to combat. It is accompanied by an acute inflammation of the eyelids and may affect the cornea, the exterior covering of the eyeball, with temporary impairment of vision.

Prior to Mr. George's address, Axel Christiansen gave a humorous account of the varied experiences of Danish and Swedish immigrants in America.

S. California Turns Out Strong for Dietert

By E. M. Hagener,* Los Angeles

THE Southern California Chapter held its regular meeting at the Elks Club, Los Angeles, January 15, with Chapter Chairman Earl Anderson, Enterprise Iron Works, Los Angeles, presiding over the dinner and session. Leo H. Klitsche, coordinator of war production training program in vocational education, put the proposition up to the members of taking full advantage of the foundry training facilities in the Los Angeles city school system for both boys and adults.

Mr. Klitsche stated that an opportunity is open for men and women not engaged in essential work to receive training in a vital industry. Robert Gregg was appointed chairman of a committee to meet with the city board of education and initiate a definite program.

*General Metals Corp., and Secretary of the Southern California Chapter.

A. H. Popperwell
Reliable Iron Foundry, Los Angeles
Director
Southern California Chapter

W. C. Schulte
Curtiss Propeller Div., Curtiss-Wright Corp., Caldwell, N. J.
Director
Metropolitan Chapter

More than 150 members and guests turned out to hear the main speaker, H. W. Dietert, Harry W. Dietert Co., Detroit, who explained the necessity of making sand and sand problems interesting to foundrymen in order to bring out and solve individual plant problems.

Mr. Dietert revealed the behavior of sand and sand mixes at pouring temperatures by means of color motion pictures showing test runs in a dilatometer. He thus proved that molding and core sand must be mixed, bonded and handled with knowledge and care in order to obtain efficient foundry practice. His talk was voted one of the most interesting ever presented to the chapter, and of real benefit to the industry.

Magnesium Casting Is Metropolitan Subject

By R. E. Ward,† Bendix, N. J.

A SPLENDID turnout welcomed National A.F.A. President Duncan P. Forbes, Gunite Foundries Corp., Rockford, Ill., to the February 1 meeting of the Metropolitan Chapter of the Association, held at Essex House, Newark, N. J. Mr. Forbes spoke briefly on the work of the Association and chapters in the war effort, pointing out that the prime purpose of A.F.A. is the broad dissemination of technical and practical foundry information.

Fred Foxall, Eclipse-Pioneer Div., Bendix Aviation Corp., Bendix, was introduced as the main guest speaker, presenting an excellent description of steps to be taken in laying out a high production magnesium casting foundry. One of the most important points stressed was the necessity for allowing sufficient storage space between operations in order to smooth the production flow, and the allowance for sufficient melting capacity, due to the large gates and risers and ordinary metal loss encountered in casting magnesium.

After reviewing the equipment for a continuous foundry, Mr. Foxall described the course of a casting through the foundry from melting to shipping, touching upon all phases of magnesium foundry operation as he went along.

†Eclipse Aviation Div., Bendix Aviation Corp., and Chairman of the Publicity Committee for the Metropolitan Chapter.

New England Talks Of Vital Materials

By M. A. Hosmer,** Boston, Mass.

NEWLY elected officers of the New England Foundrymen's Association presided at the regular meeting held February 10 at the Engineers Club, Boston, with President A. W. Calder, New England Butt Co., Providence, R. I., occupying the chair. President Calder introduced the guest speaker of the evening, Maj. Alex Smith, New

**Hunt-Spiller Mfg. Corp., and Reporter for the New England Foundrymen's Association.

England field director for the Industrial Service Division, Bureau of Public Relations of the War Department, with offices in Boston.

Major Smith, formerly director of all General Electric Co. publications, paid tribute to the Foundry Industry and its contribution in production of war materials. He stressed the vital need of materials in this conflict, the many improvements made in ordnance, and stated that much had been accomplished in saving time and materials. He offered the services of his division in working out wartime problems of materials in the castings industry.

President Calder appointed a special committee to assist in the A.F.A. Cupola Research Project, consisting of R. F. Harrington, Hunt-Spiller Mfg. Corp., C. W. Wyatt, and B. W. Hagerman.

Absenteeism Is Vital W. Michigan Subject

By K. C. McCready,* Sparta, Mich.

THE nationally important problem of absenteeism, in sharp war production focus during recent months, was discussed

A. E. Jacobson
Grand Haven Brass Foundry,
Grand Haven, Mich.
Director
Western Michigan Chapter

at the February meeting of the Western Michigan Chapter, held at the Ferry Hotel, Grand Haven, Mich. Chapter Chairman C. J. Lonnee, Muskegon Piston Ring Co., and program chairman D. F. Seyferth, West Michigan Steel Foundry Co., Muskegon, led the informal round-table discussion of the evening.

Practically everyone attending participated in the discussion, many causes, remedies and experiences being related. One point developed, which made the question of greater significance, was the fact that every man present has had some trouble with the matter of absent workers.

*Muskegon Piston Ring Co., and Secretary of the Western Michigan Chapter.

Ontario Greets A.F.A. President Forbes and Hears H. W. Dietert

B. G. L. White,† Toronto, Ont.

AN EXCELLENT attendance turned out for the January 29 meeting of the Ontario Chapter, at Hamilton, with the double attraction of Harry W. Dietert's illustrated sand address and the annual visit of A.F.A. President D. P. Forbes, Gunite Foundries Corp., Rockford, Ill. Chapter Chairman J. J. McFadyen, Galt Malleable Iron Co., Ltd., Galt, Ont., presided at the meeting, with G. O. Loach, Otis-Fensom Elevator Co., Ltd., Hamilton, acting as technical chairman.

Following dinner, President Forbes spoke briefly of the work of the Association, and reminded members of the Foundry Congress in St. Louis, April 28-30. He referred to the enormous amount of technical information made available by A.F.A., and stated that if A.F.A. activities could be sold to the industry more thoroughly it would be a big step in aiding the industry to meet growing competition from other fields.

On the technical side, Mr. Dietert, Harry W. Dietert Co., Detroit, gave the chapter an excellent understanding of the effect of high temperatures on core and molding sands. With colored movies he illustrated the reaction of sand to high temperatures, through dilatometer tests. Where sand expansion, due to growth of silica grains, is so great as to cause difficulties in castings, he said, it may be reduced by various modifications of the sand.

Mr. Dietert pointed out the necessity of adjusting the collapsibility of cores for the job in which they are used, fissures being likely to result when the core surfaces collapse ahead of metal solidification. He discussed means of slowing up the collapsibility of cores, and improving the hot strength. In many types of castings, he said, if the core has too high a retained strength, cracking of the casting will result on solidification. In one instance noted, drastic reduction in retained strength of the core eliminated cracking.

J. J. McFayden
Galt Malleable Iron Co., Ltd.,
Galt, Ont.
Chairman
Ontario Chapter

†Canadian Metals and Metallurgical Industries, and Secretary-Treasurer of the Ontario Chapter of A.F.A.

Cupola Operation Is Subject at Montreal

By A. E. Cartwright,** Montreal, Que.

THE recently formed Eastern Canada and Newfoundland Chapter is proving an energetic and enthusiastic addition to the Association, growing in numbers at no small rate with the passing of each month.

On January 22, the latest of a series of successful evenings was addressed by A. W. Gregg, Whiting Corp., Harvey, Ill., whose subject, "Cast Iron Melting Practices," was featured by a description of the latest prac-

**Robert Mitchell & Co., Ltd.

tices and adaptations of cupola melting methods. Triplex melting for production of steel and desulphurizing and dephosphorizing methods and possibilities, were included.

Some sound advice also was given on every-day cupola operation and a motion picture, exemplifying his descriptions, rounded out the subject.

The 100 members and guests present gave evidence of their extreme interest by the many questions put to the speaker following the talk.

Central Indiana Men Hear All About Coke

By Ralph A. Thompson,* Indianapolis

"COKE and By-Products" was the main subject taken up at the February 1 regular meeting of the Central Indiana Chapter, held at the Washington Hotel, Indianapolis. Sixty-five members and guests attended the technical meeting, at which Chapter Chairman B. P. Mulcahy, Citizens Gas & Coke Utility, Indianapolis, presided.

The guest speaker was H. E. Baughman, manager of the coke plant, Wheeling Steel Corp., Portsmouth, Ohio, whose complete knowledge of coke and its production made possible a complete and highly informative talk. The question period that followed was quite lively, proving that considerable information is desired on the handling of coke in these days when materials are so difficult to obtain.

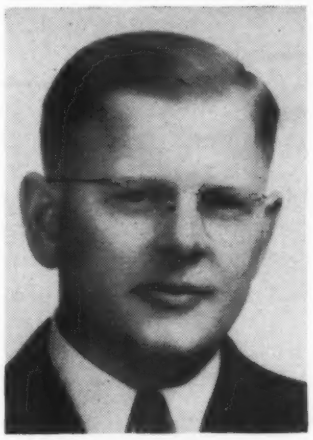
*Electric Steel Castings Co., and Secretary, Central Indiana Chapter.

NEO Chapter Looks At Foundry Future

By Edwin Bremer,† Cleveland

MORE than 100 members and guests were present at the regular monthly meeting of the Northeastern Ohio Chapter of A.F.A., held February 11 at the Cleveland Club, Cleveland. Chapter President John H. Tressler, Hickman Williams & Co., Cleveland, presided, the meeting opening with a motion picture on the "Care and Use of Grinding Wheels," presented through courtesy of the Norton Company, Worcester, Mass.

Principal speaker was Arthur J. Tuscany, Foundry Equipment Manufacturers' Association, Cleveland, whose topic "Let's Look at the Foundry Industry—Winning the War, and Then What?" encompassed both post-war and wartime problems of foundrymen. While the foundry industry, with a capital investment of a billion dollars and employing half a million men and women, is doing a huge job in the war effort, he said, few people realize it.



M. G. Thomas
City Foundry Co., Cleveland
Director
Northeastern Ohio Chapter

Mr. Tuscany urged foundrymen to get together and make a concerted effort to promote recognition of the industry. He declared that foundries should obtain the highest possible priority ratings for materials and equipment, since suppliers must have such ratings in order to secure their materials.

As to the future, the speaker stated that the industry must do a first-class selling job to meet post-war competition. This merchandising job means that all branches of the castings industry must join together in an intelligent, cooperative plan to fight competition from the outside, forgetting any internal difference. Several examples of successful selling campaigns by organized industries were cited to prove that such a plan is workable.

†The Foundry, and Chairman of Publicity for Northeastern Ohio Chapter.

N. California A.F.A. and A.S.M. in Joint Meeting

By G. L. Kennard,** San Francisco

NORTHERN California Chapter of A.F.A. and the Golden Gate chapter of the American Society for Metals held their annual joint meeting January 26, at the Engineers Club, San Francisco, with some 80 attending. The honor of welcoming members and guests was divided between A.F.A. Chapter Chairman F. A. Mainzer, Pacific Brass Foundry of San Francisco, and John Birmingham, chairman of the A.S.M. chapter, each calling on their program chairmen for reports.

After introductions the meeting was turned over to the program chairman, Serge P. Kovaleff, Enterprise Engine & Foundry Co., South San Francisco, and a member of both groups. Mr. Kovaleff introduced the speakers of the evening, A. L. Lyman, manager of Richmond research laboratories of Standard Oil Co. of California, and P. M. Joslyn, Joslyn & Ryan, naval architects.

Mr. Lyman presented a paper on the history of petroleum, especially recent developments in increasing the use of petroleum.

Harry A. Bossi
H. C. Macaulay Foundry Co.,
Berkeley, Calif.
Vice-Chairman
Northern California Chapter

Mr. Joslyn, whose firm is working on orders of the Navy and Maritime Commission, spoke chiefly on specifications for out-

**Northern California Foundrymen's Institute, and Secretary-Treasurer of the Northern California Chapter of A.F.A.

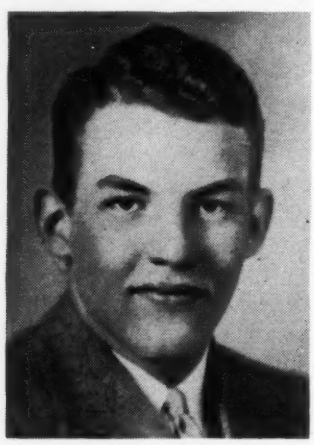
fitting ships, as being of particular interest to the group. He covered the question of inspections required, and the need for cooperation by manufacturers in facilitating maximum local use of production equipment in meeting war requirements. A salient point made was the necessary change in castings caused by unusual conditions due to exposure to torpedoes and depth bombing, of utmost importance in this global war.

Quad City Group Learns More About Molding Sand Control

By H. L. Creps,* Moline, Ill.

SIXTY-TWO members of the Quad City Chapter braved low temperatures and a severe snowstorm for the regular monthly meeting, held January 18 at Fort Armstrong Hotel, Rock Island, Ill. A.F.A. President D. P. Forbes, Gunite Foundries Corp., Rockford, Ill., was present and, after a meeting with the chapter directors prior to dinner, supplied information concerning chapter activities. Mr. Forbes extended greetings from Association headquarters to the local chapter and invited the members to attend the War Production Foundry Congress in St. Louis, April 28, 29, 30.

R. H. Swartz
Ordnance Steel Foundry Co.,
Bettendorf, Iowa
Director
Quad City Chapter



Harry L. Mead
John Deere Harvester Works,
East Moline, Ill.
Director
Quad City Chapter

Main scheduled speaker of the evening was Rudy E. Wilkie, Deere & Co., Moline, whose subject, "Molding Sand Control," proved unusually interesting. He utilized broad experience in outlining the importance of testing sand and correlating the physical properties with actual results. Full knowledge and control of moisture content, he stated, is a most effective means of improving casting practice. His talk was followed by an extended question period, at which further points were brought out.

The regular monthly meeting of the Quad City Chapter of A.F.A. was held February 15 at the LeClaire Hotel, Moline, Ill., with 66 members in attendance and Chapter Chairman Alex D. Matheson, French & Hecht, Inc., Davenport, Iowa, presiding. A.F.A. Secretary R. E. Kennedy, Chicago, gave a brief resume of chapter activities throughout the country, pointing out the great value today in mutual exchange of ideas. He also called attention to the Foundry Congress in St. Louis, April 28-30.

The technical subject of the evening was "Aluminum and Light Alloys," presented by Howard J. Rowe, Aluminum Co. of America, Cleveland. Twenty students of the National Aircraft School, Rock Island, Ill., were present to listen to Mr. Rowe.

The speaker presented a technicolor movie entitled "Unfinished Rainbows" outlining the history of aluminum, and discussed the melting, pouring and gating of aluminum castings. He outlined various modern practices in use to overcome gas absorption and dross formation, and spoke of the post-war possibilities for light alloys. Mr. Rowe predicted that large tonnages of secondary aluminum would be on the market immediately after the end of war.

*Frank Foundries Corp., and Recording Secretary for the Quad City Chapter of the Association.

W. New York Takes Up Non-Ferrous Practice

By John R. Wark,† Buffalo, N. Y.

ONE hundred and sixty members and guests of Western New York chapter voted the regular monthly meeting held February 6 one of the finest ever. The event was held at Hotel Seneca, Rochester, N. Y., instead of in Buffalo, with Chapter Chairman Ralph T. Rycroft, Jewell Alloy & Malleable Co., Inc., Buffalo, presiding. The meeting began with an excellent steak dinner (yes, we said steak!), followed by a wonderful floor show arranged by Irving Rosenthal, Rochester Smelting & Refining Corp.

Chairman Rycroft called on Don H. Rishor, Geo. F. Pettinos, Inc., Rochester, to introduce the speakers of the evening, H. H. Judson of Gould Pumps, Inc., Seneca Falls, N. Y., and R. E. Kennedy, Chicago, National Secretary of A.F.A. Mr. Judson presented a most interesting talk on "Non-Ferrous Castings," drawing on many years of both practical experience and scientific research.

Mr. Kennedy told of the progress made by the Western New York and other chapters of the Association, and called attention to the 2nd War Production Foundry Congress of A.F.A., to be held in St. Louis, April 28-30.

Chairman Rycroft announced the new appointment of Ed. P. Meade, Sargent & Greenleaf,

†Queen City Sand & Supply Co., and Secretary, Western New York Chapter of A.F.A.

Inc., Rochester, as a Director of the chapter to fill the unexpired term of Frank J. Comerford, Symington-Gould Corp., who recently was transferred to Pittsburgh by his firm. As a final treat, excellent moving pictures on foundry sand methods and control were shown by courtesy of Whitehead Brothers Co.

January Meeting

To conserve time and transportation, the regular monthly meeting of the Western New York Chapter was combined with the annual stag dinner, and held January 15. Fully 318 members and guests attended the popular event, staged at the club house of Troop I, American Legion, in Buffalo, with Chapter Vice-Chairman Frank E. Bates, Worthington Pump & Machinery Corp., Buffalo, presiding.

A technical program featured Prof. John McManus, University of Buffalo, Buffalo, who was introduced by Van Whitehead, Whitehead Bros. Co., Buffalo. Prof. McManus announced that the Engineering College of Cornell University has started extension courses at the University of Buffalo in relation to war production work, the courses dealing with metallurgy and related foundry subjects.

Following reports by Ed Meade, and by Chapter Treasurer M. W. Pohlman, Pohlman Foundry Co., Inc., Buffalo, the program chairman took over and presented a splendid evening of entertainment, fully worthy of the traditions of the annual stag.

January Meeting of Minnesota U. Chapter

By Clifton Priest,* Minneapolis

EIGHTEEN members of the University of Minnesota Student Chapter attended the January 18 meeting, held at Coffman Memorial Union of the university. Guest of honor was A.F.A. National Secretary R. E. Kennedy, Chicago.

Secretary Kennedy, following the dinner, discussed at length the placement of college students and graduates in the foundry industry. He also explained plans for the 2nd War Production Foundry Congress at St. Louis, the latter part of April.

Plans were made for participation of the chapter in the university's annual Engineers Day, which will be presided over by Chapter President Miles B. Olson. Several members indicated their intention of entering the A.F.A. Student Essay Contest, announced in recent issues of "American Foundryman."

*Student, University of Minnesota Engineering School, reporting for the University of Minnesota Student Chapter of A.F.A.

Wisconsin Chapter Sponsors Sectional Apprentice Meeting

By C. W. Morisette,† Milwaukee, Wis.

SOME 45 apprentices attended the first apprentice sectional meeting of the Wisconsin chapter of A.F.A., held January 15 at the Hotel Schroeder, Milwaukee. The meeting, sponsored by the chapter's apprenticeship committee, was held in conjunction with other sectional meetings for the purpose of acquainting apprentices with the obligations of apprenticeship and the 1943 A.F.A. National Apprentice Contests.

Speakers included J. R. Van Kooy, patternmaking instructor, Milwaukee Vocational School, Milwaukee, who discussed "What Happens to the Graduate Apprentice." R. E. Kennedy, National Secretary, American Foundrymen's Association, Chicago, outlined the history and purpose of the apprentice contests. Carl Rothe, apprentice supervisor, Wisconsin Industrial Commission, Milwaukee, discussed the draft status of apprentices.

Two Apprenticeship Views

Mr. Van Kooy stated that the employer sees the training of apprentices in light of a future supervisory staff, whereas the apprentice must think in terms of increasing the value of his services. Results of a training program are mainly up to the apprentice. There is no limit of achievement if experience and education are predetermined, he stated. "You know it," he said; "You must start early, you must sacrifice, you must be willing, and you must be able to get along with others."

In outlining the history of the A.F.A. apprentice contests Mr. Kennedy pointed out that the A.F.A. apprentice committee is one of the oldest standing committees in the organization, dating from 1896, and that Wisconsin has been a leader in apprentice work for many years. The first apprentice contests sponsored by the Association were held in 1924 at the Milwaukee Vocational School.

Purpose of the contests, Mr. Kennedy said, is to interest both management and apprentices in improving the work of apprentices through comparison with the work of other plants, with a competitive stimulus. He presented a number of slides depicting early foundry work, including the famous Liberty Bell, and traced the making of bronze molds back to 3000 B.C., cast iron back to 2000 B.C.

In discussing the draft status of apprentices, Mr. Rothe outlined present methods for entering military service and suggested procedure.

†Foundry Instructor, Milwaukee Vocational School.

Book Review

The Blast Furnace, by Roy P. Hudson, hard cloth bound, 5½ x 8½-in., 254 pages, 9 illustrations. Published by the Chemical Publishing Co., 234 King St., Brooklyn, N. Y. Price $3.75 per copy.

This book comes with the endorsement from Ralph H. Sweetser, consultant in blast furnace practice, and a man "than whom there is none whom-er" in that field. Mr. Sweetser says, "It was with pleasant surprise and gratification that I read the excellent book that has come from the pen of Mr. Hudson." Such praise

from such an authority must have been gratifying both to the author and his publishers.

The book, as a whole, is divided into three parts, the first dealing with blast furnace raw materials and the second, with its products and by-products. The third section is devoted to sampling and analysis. The first section covers the furnace itself, and iron ores, fluxing stone, fuel and its behavior in the furnace. It also covers the chemical principles involved in blast furnace operation, charging or burdening, and the blast. The three subjects discussed in the second section are pig iron and ferro-alloys, blast furnace slag and blast furnace gas.

The third section, dealing with sampling and analysis, covers those operations for iron bearing materials, fluxing stone, fuel, pig iron and ferro alloys, slag and blast furnace gas. Specific directions are given in each case as to how the sampling should be conducted, the sample prepared and finally the analysis.

As is stated in the preface, this book fills a need in industry and should be of interest to foundrymen who wish to know more about some of the blast furnace products that they use daily in their shops.

Book Review

Melting Furnaces for Gray Cast Iron, Report of the Melting Furnaces Subcommittee, Technical Committee, Institute of British Foundrymen, 4¾x7 in., paper cover, 80 pages, 7 illustrations, published by The Institute of British Foundrymen, St. John Street Chambers, Deansgate, Manchester, 3, England. Price, $2.50. Special price to students, $1.25.

This report is divided into seven sections as follows: (1) Introduction, (2) crucible furnaces, (3) air furnaces, (4) electric furnaces, (5) rotary melting furnaces, (6) cupolas, and (7) melting costs.

Each section describes the various types of furnaces under the particular class and also gives directions for operation. In some instances, performance comparisons are given as well as the metallurgical considerations to be observed in operation of the furnaces.

By far the largest section of the report deals with cupolas.

War Problems Committees of A.F.A. Chapters

Birmingham District

Chairman, Dr. J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham.

Central Indiana

Chairman, Harold Lurie, Cummins Engine Co., Columbus.

Castings Specifications
Harold Lurie, Cummins Engine Co., Columbus.

Gray Iron
R. H. Bancroft, Perfect Circle Co., Newcastle.

Malleable Iron
S. C. Wasson, National Malleable & Steel Castings Co., Indianapolis.

Steel Castings
I. R. Wagner, Electric Steel Castings Co., Indianapolis.

Brass
Chas. Beckett, Beckett Bronze Co., Muncie.

Aluminum and Magnesium
Chas. Gisler, C. & G. Foundry & Pattern Works, Indianapolis.

Chesapeake

Chairman, E. W. Horlebein, The Gibson & Kirk Co., Baltimore, Md.

Steel
H. F. Taylor, Naval Research Laboratory, Washington, D. C.
T. C. Worley, Bethlehem Steel Corp., Sparrows Pt., Md.

Gray Iron
Max Kuniansky, Lynchburg Foundry Co., Lynchburg, Va.
F. G. Roemer, The Balmar Corp., Baltimore, Md.

Malleable Iron
David Tamor, American Chain & Cable Co., York, Pa.

Brass, Bronze & Aluminum
Earl J. Bush, Washington Navy Yard, Washington, D. C.
A. H. Hesse, Naval Research Laboratory, Washington, D. C.

Patterns
J. O. Danko, Danko Pattern & Mfg. Co., Baltimore, Md.
J. A. Heard, Crown Cork & Seal Co., Inc., Baltimore, Md.

Welding
Clyde L. Frear, Bureau of Ships, Navy Dept., Washington, D. C.

Job Training
D. F. Lane, Bethlehem Steel Corp., Sparrows Point, Md.
Geo. L. Webster, Baltimore Polytechnic Inst., Lutherville, Md.

Sand
C. M. Saeger, Jr., Bureau of Standards, Washington, D. C.

Chicago

Chairman, E. R. Young, Climax Molybdenum Co.
Vice-Chairman, L. L. Henkel, War Production Board
Secretary, N. F. Hindle, American Foundrymen's Assn.

Brass & Bronze
H. M. St. John, Crane Co.
C. K. Faunt, Christensen & Olsen Foundry Co.

Steel
L. H. Hahn, Sivyer Steel Casting Co.
F. S. Sutherland, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Malleable
L. J. Wise, Chicago Malleable Castings Co.
W. D. McMillan, International Harvester Co., McCormick Works.

Cast Iron
L. H. Rudesill, Griffin Wheel Co.
J. H. Gellert, Nichol-Straight Foundry Co.

Aluminum
G. H. Starmann, Apex Smelting Co.

Magnesium
G. H. Curtis, Chrysler Corp., Dodge Chicago Plant.

Cincinnati

Chairman, Stanton T. Olinger, Cincinnati Gas & Electric Co.

Gray Iron
Jos. Schumacker, Cincinnati Milling Machine Co.

Non-Ferrous
Ed. Korten, Reliable Pattern & Foundry Co.

Pattern Making
Charles Appel, The Lunkenheimer Co.

Alloys
Earl Kindinger, Williams & Co., Inc.

Pig Iron
Robt. Ebersole, Miller & Co.

Scrap Iron
L. W. Pryse, Hickman Williams & Co.

Steel
J. B. Caine, Sawbrook Steel Castings Co.

Detroit

Chairman, F. A. Melmoth, Detroit Steel Casting Co.

Steel
Ernest Lancashire, Detroit Steel Casting Co.
R. J. Wilcox, Michigan Steel Casting Co.

Gray Iron
V. A. Crosby, Climax Molybdenum Co.
L. W. Thayer, Cadillac Motor Car Div.

Malleable
C. F. Joseph, Saginaw Malleable Iron Div., Saginaw, Mich.
G. L. Galmish, Michigan Malleable Iron Co.

Aluminum & Magnesium
M. E. Brooks, Dowmetal Foundry, Bay City, Michigan.

Brass & Bronze
J. P. Carritte, Jr., True Alloys, Inc.

Metropolitan

Chairman, J. S. Vanick, International Nickel Co., New York.

Aluminum, Magnesium, Light Metals
R. E. Ward, Bendix Aviation Corp., Bendix, New Jersey.

Steel
K. V. Wheeler, American Steel Castings Co., Newark, N. J.

Brass & Non-Ferrous Foundry
D. E. Broggi, Neptune Meter Co., Long Island City, N. Y.

Brass & Non-Ferrous Castings
S. Frankel, H. Kramer & Co., New York.

Pig Iron
N. Anderson, Debevoise-Anderson Co., New York.

Cupola Practice & Foundry Equipment
H. A. Deane, American Brake Shoe & Foundry Co., Mahwah, N. J.
D. J. Reese, International Nickel Co., New York.

Pressure Castings
R. J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J.

Gating & Risering Small Castings
W. T. Dette, Robins Conveying Belt Co., Passaic, N. J.

Gating & Risering Heavy Gray Iron Castings
J. W. Reid, R. Hoe & Co., Dunnellen, N. J.
David MacIntosh, Sacks-Barlow Foundries, Inc., Newark, N. J.

(Continued on next page)

The section on this furnace class includes a general description of such furnaces, and discusses such subjects as internal diameter, height of tuyeres, height of charging door above tuyeres, number and size of tuyeres, wind belt and blast main, height of chimney, air supply, method of operation, theory of operation, blast volume and pressure, weight of metal and coke charges, flux additions, changes in metal during melting, slag, and maintenance. This section also contains a recommended practice for the operation of a 36-in. cupola. The latter part of that section describes special cupolas such as the hot blast, Poumay and balanced blast types.

The section on costs, while interesting and possibly comparative, is of little specific value to foundrymen in this country because of the differences in conditions existing in Britain and America.

Book Review

Elementary Metallurgy, by W. T. Frier, 5¾ x 8¼ in., cloth cover, flexible binding, 207 pages, 109 illustrations and charts. Published by McGraw-Hill Book Co., 330 West 42nd St., New York. Price $1.75 per copy.

The author of this book is foundry control chemist, General Electric Co., Erie, Pa., and instructor in metallurgy at the night school conducted at that plant.

Obviously, it is impossible to do little more than touch the high-spots on the subject so vast as metallurgy in a book of this size. Nevertheless, the author has done a very creditable job. He begins with the iron ore and carries through the various processes used to produce the different types of cast and formed metals. The theoretical as well as the practical aspects of metallurgy are touched upon, including such subjects as furnaces and processes, methods of forming metals, heat treatment, grain structure and constitution diagrams.

The various classes of nonferrous alloys are discussed in a single chapter. Of special interest is the final chapter on testing methods which gives the beginner, for whom the book is written, a good but quick view of the various tests performed on metals and their meaning.

War Problems Committees of A.F.A. Chapters (Cont.)

Cores, Sand, Refractories
W. G. Reichert, American Brake Shoe & Foundry Co., Mahwah, N. J.
Government Specifications
N. A. Kahn, U. S. Navy Yard, Brooklyn, New York.
Heat-Resisting Alloy Castings
E. Cook, American Brake Shoe & Foundry Co., Mahwah, N. J.

Michiana

Chairman, R. E. Patterson, Elkhart Fdry. & Machine Co., Elkhart, Ind.
Advisory, Dr. E. G. Mahin, University of Notre Dame, South Bend, Ind.
Magnesium, Aluminum & Brass
A. T. Ruppe, Bendix Products Div., Bendix Aviation Corp., South Bend.
Steel
Herman Hess, Clark Equipment Co., Buchanan, Michigan.
Malleable and Gray Iron
J. E. Drain, Oliver Farm Equipment Co., South Bend.

Northeastern Ohio

Chairman, F. G. Steinebach, The Foundry, Cleveland.
Gray Iron
A. C. Denison, Fulton Foundry & Machine Co., Cleveland.
F. J. Dost, Sterling Foundry Co., Wellington, Ohio.
Wm. J. Feth, Forest City Foundries Co., Cleveland.
Malleable Iron
F. A. Stewart, National Malleable & Steel Castings Co., Cleveland.
J. H. Lansing, Malleable Founders' Society, Cleveland.
J. J. Witenhafer, Lake City Malleable Co., Cleveland.
Steel
Ralph R. West, West Steel Castings Co., Cleveland.
J. Trantin, Jr., Youngstown Alloy Casting Corp., Youngstown, Ohio.
C. W. Briggs, Steel Founders' Society of America, Cleveland.
Brass and Bronze
E. F. Hess, Ohio Injector Co., Wadsworth, Ohio.
G. L. Bierly, Mansfield Brass Foundry, Inc., Mansfield, Ohio.
Aluminum and Magnesium
Fred S. Wellman, Wellman Bronze & Aluminum Co., Cleveland.
H. C. Nicholas, Quality Castings Co., Orrville, Ohio.
H. J. Rowe, Aluminum Co. of America, Cleveland.
Patterns
J. V. Brost, Brost Pattern & Casting Co., Cleveland.
M. E. Kohler, Scientific Cast Products Corp., Cleveland.
J. S. Parker, Motor Patterns Co., Cleveland.
Pig Iron
T. G. Johnston, Republic Steel Corp., Cleveland.
A. D. Smith, Bethlehem Steel Co., Cleveland.
Wm. Ramsey, Pickands, Mather & Co., Cleveland.
Cupola Operation
W. O. Larson, W. O. Larson Foundry Co., Grafton, Ohio.
Wm. C. Manwell, Fulton Foundry & Machine Co., Cleveland.
Milton Tilley, National Malleable & Steel Castings Co., Cleveland.
Core Production
E. C. Zirzow, National Malleable & Steel Castings Co., Cleveland.
Wm. Kayel.

Philadelphia

Chairman, J. H. S. Spencer, H. W. Butterworth & Sons Co., Philadelphia.

Quad City

Chairman, P. T. Bancroft, Republic Coal & Coke Co., Moline, Ill.
A. H. Putnam, A. H. Putnam Co., Rock Island, Ill.
C. F. Burgston, Deere & Co., Moline.
W. E. Jones, Ordnance Steel Foundry, Bettendorf, Iowa.
C. S. Humphrey, C. S. Humphrey Co., Moline.
John Diedrich, Blackhawk Foundry & Machine Co., Davenport, Iowa.

St. Louis

Chairman, C. B. Shanley, Semi-Steel Casting Co., St. Louis, Mo.
Vice-Chairman, L. V. Kleber, General Steel Castings Corp., Granite City, Ill.
Secretary-Treasurer, John H. Williamson, M. A. Bell Co., St. Louis.
L. C. Farquhar, American Steel Foundries, East St. Louis, Ill.
W. E. Illig, Banner Iron Works, St. Louis.
A. O. Nilles, Griffin Wheel Co., North Kansas City, Kans.
F. O'Hare, Central Brass & Aluminum Foundry, St. Louis.
L. J. Desparois, Pickands Mather & Co., St. Louis.
E. A. Goerger, City Pattern & Model Co., St. Louis.
H. Goodwin, Medart Co., St. Louis.
W. L. Kammerer, Midvale Mining & Mfg. Co., St. Louis.
F. B. Riggan, Key Co., E. St. Louis, Ill.
G. W. Mitsch, American Car & Foundry Co., St. Louis.
Jas. Roland, Fry-Fulton Lumber Co., St. Louis.
W. A. Zeis, Midwest Foundry & Supply Co., Edwardsville, Ill.

Western New York

Chairman, Wm. S. Miller, Chas. C. Kawin Co., Buffalo, N. Y.
Gray Iron
Alex Rankin, Lake Erie Engineering Corp., Kenmore, N. Y.
M. W. Pohlman, Pohlman Foundry Co., Inc., Buffalo.
Malleable
J. W. Considine, Jewell Alloy & Malleable Co., Inc., Buffalo.
F. J. Wurscher, Acme Steel & Malleable Iron Works, Buffalo.
Steel
J. P. Begley, Pratt & Letchworth Co., Buffalo.
J. H. Sander, American Radiator & Standard Sanitary Corp., Buffalo.
Non-Ferrous
J. C. McCallum, McCallum-Hatch Bronze Co., Buffalo.
H. R. King, Metal & Alloy Specialties Co., Inc., Buffalo.

Wisconsin

Chairman, Wm. J. MacNeill, Federal Malleable Co., Milwaukee.
Gray Iron
W. F. Bornfleth, Cutler-Hammer, Inc., Milwaukee.
John A. Leisk, Allis-Chalmers Mfg. Co., Milwaukee.
E. L. Roth, Motor Castings Co., W. Allis, Wisconsin.
L. V. Tuttle, Koehring Company, Milwaukee.
Malleable Iron
R. J. Anderson, Belle City Malleable Iron Co., Racine, Wis.
C. A. Gutenkunst, Jr., Milwaukee Malleable & Grey Iron Works, Milwaukee.
Non-Ferrous
Roy M. Jacobs, Standard Brass Works, Milwaukee.
V. C. Mekeel, Ampco Metal, Inc., Milwaukee.
Steel
A. T. Baumer, Wehr Steel Co., Milwaukee.
Carl F. Haertel, Falk Corp., Milwaukee.

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.
When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, New York.

Alloy

STEEL *(See Steel.)*

Aluminum

CASTING ALLOYS. *(See Non-Ferrous.)*

Aluminum and Magnesium

SCRAP RECOVERY. *(See Non-Ferrous.)*

Bismuth

BRASS EFFECTS. *(See Non-Ferrous.)*

Brass

BISMUTH EFFECTS. *(See Non-Ferrous.)*

Cast Iron

ALLOYING. *"Economical Alloying of Gray Cast Iron,"* R. G. McElwee and T. E. Barlow, *The Foundry*, vol. 70, No. 6, June 1942, pp. 54-55, 141-146. Materials saving is today good cost economy. Simply because a casting is vital to the war effort and carries a high priority rating does not justify waste of material through inefficient or careless practice. The most desirable single factor in alloying economy is uniformity. Most obvious method of economizing is by adjusting the base iron composition as closely as possible to the desired structure, requiring thorough knowledge of effects of alloying elements, and determining on the controlling section. Many foundrymen have found they can meet requirements by making higher carbons irons (as much as 3.40 total carbon) and adjusting the silicon content to control structure. Methods of eliminating trouble from low silicon irons are discussed. Uniformity involves uniform analyses of the iron at the spout, uniform cupola operation, use of mixing ladles, equipment for control of oxygen and moisture content of the blast. Few castings, unless ladle treated, are completely normal or completely modified in all sections. The graphite nuclei theory, silicate slime theory and degasification theory of ladle additions are commented on. Ladle inoculation is the most efficient method of controlling uniformity of structure, and permits wider choice of raw materials and base iron.

BALANCED BLAST CUPOLA. *"British Benefit by Balanced Blast Cupola," Canada's Foundry Journal,* vol. 15, No. 11, November 1942, pp. 5-6, 8. Until recent years, general cupola practice was to minimize CO formation by forcing excessive air into the cupola, this excessive air frequently leading to increased amounts of coke and setting up an intense oxidizing atmosphere. Closer cupola control then led to considerable improvements, such as Fletcher's balanced blast cupola, a specially designed cupola, particularly as to tuyeres, with all tuyeres adjustable so as to obtain a correct balance of air between the main and auxiliary tuyeres. The tuyere arrangement consists of a lower row of main tuyeres and valves and two or more rows of small auxiliary tuyeres, all adjustable and all fitted with an inspection glass, permitting constant observation of melting conditions even though tuyeres are closed. Main tuyeres are controlled by fine adjustable screw valves, governing the size of the blast inlet. The arrangement permits elasticity of operation and very close control. By correcting balancing blast conditions, the entire cupola area is effective. In practice the balanced blast cupola has shown the advantage of being able to control the air supply over the entire coke bed, thus maintaining the entire bed in an incancescent state at high temperature. The incandescent bed acts as a thermal storage, tending to prevent variations in casting temperature of the metal.

CUPOLA OPERATION. *"Cupola Operation,"* W. O. McMahon, *Pig Iron Rough Notes,* Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., No. 89, Summer 1942, pp. 31-34. Continuation of a series of articles dealing in general terms with fundamental aspects of cupola operation. Materials used are the keynote of good service in putting in the breast and tap hole. With intermittent tapping, consideration should be given the size of the tap hole in relation to melting rate and ladle capacity. Tap hole sizes are given for various melting rates. Scale of measures is given for the dam for varying pressures. Suggestions are given for the size and design of pouring trough.

CUPOLA THERMAL DATA. *"Thermal History of Cast Iron,"* Michael Fielden. *Iron and Steel,* vol. 16, No. 1, October 1942, pp. 2-4. Fuel economy in cupola operation is bound up with a proper understanding of what the author calls "thermal history," or a complete understanding of what happens in the cupola and why. Among the factors discussed are the reduction of carbon dioxide and production of CO by consideration of the mass of fuel charged between consecutive loads of iron; rate of combustion in terms of heat intensity and the fact that melting must proceed across the full cross-section of the cupola; tuyere areas, particularly the distance between bottom of the lower tuyeres and the sand bed (given as not over 12 in. for continuous tapping); volume of air supply, accurate measurement of which is considered of considerably less importance than other factors; superheating; pouring temperature, with the emphasis on hot pouring; slagging; accuracy of flux additions, especially with regard to the weight of fluxes; and lime contents of slag, not less than 25 per cent being advocated for conditions of irregular demand.

DAMPING CAPACITY. *"Modulus of Elasticity and Damping of Iron Alloy," Foundry Trade Journal,* vol. 68, No. 1370, November 19, 1942, p. 260. Both the modulus of elasticity and the damping of a material are well defined physical properties, the former being a measure of the atomic forces counteracting a change in shape of the material. By acoustic methods both magnitudes can be measure to an accuracy of 0.002 per cent in the case of the modulus, about 2 per cent for damping. In *"Archiv fur das Eisenhuttenwesen,"* W. Koster says these properties are influenced by alloying transformations and thermal and mechanical treatment. Progressive addition of carbon gradually reduces damping in iron. Graphite lowers modulus of elasticity to a marked degree and also raises the damping, which accounts for the marked damping properties of cast iron. In high-grade cast iron the modulus of elasticity increases with tensile strength, damping dropping considerably. As the temperature is raised, modulus is reduced, and above 600 degs. the damping rises very considerably. Tension and drawing slightly lower the modulus, the damping rising rapidly at first, then more slowly, to five times its original value. At room temperature, both strive to return to original values, damping value being almost fully recovered. Practically the same effect is observed on heat treatment. Damping measurements are recommended as a practical means of confirming the presence of faults, such as cracks, blowholes, pores, since these raise the damping value. Intercrystalline corrosion in particular can be detected.

PHYSICAL PROPERTIES. *"Structural Composition Controls — Physical Properties,"* F. E. Fisher, *Pig Iron Rough Notes,* Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., No. 88, Spring 1942, pp. 25-28. Many gray iron foundrymen believe that by running the same mixture day after day they are producing an iron of consistent quality with identical physical properties. Some also contend that regardless of the mixture, provided chemical compositions are the same, identical physical properties are formed, even though the mixture be entirely scrap. It has been definitely shown in recent years that the varying physical properties in irons of similar or the same chemical composition are due more to structural composition than to a few points of silicon, manganese or carbon. Foundrymen can do much to influence the formation and manner in which the four principal components (graphite, pearlite, ferrite and cementite) are distributed. The controlling factor, in addition to chemical composition, is temperature, both casting and freezing, along with rate of cooling.

ROLLS. *"Casting Alloy Rolls,"* Paul R. Ramp, *Foundry Trade Journal,* vol. 68, No. 1361, Sept. 17, 1942, pp. 57-58. Review of article previously printed in *Iron Age,* describing an economical method of molding and casting alloy rolls. After

ramming up, the mold is dried and the gate core placed in the print of the drag, the gate core having a number of pencil gates and forming the bottom of the pouring basin. Center portion forms the core print for the upper end of the main core and must be strong enough to support it. Main core is then positioned through use of a split mold, and is provided with an eye bolt, which prevents the core from moving when weight is placed on top of the core. Mold is poured in an exactly vertical position. Proper flask set-up consists of two drags with no bars except one or two tie bars. Sand strips are aided by the half-pattern that makes up the cope, which is secured by means of a wood screw through the bottom plate, eliminating danger of the core dropping out after the mold is dried. It is claimed that this type flask is easier to ram up and shake out, and the barless cope reduces possibility of soft spots under the bars.

(See Testing.)

WELDING. *"Development in Cast Iron Welding Rods and Electrodes,"* R. J. Franklin, *Canadian Metals and Metallurgical Industries,* vol. 5, No. 11, November 1942, pp. 339-340. Paper presented before 1942 annual meeting American Welding Society. Developments in electric welding of cast iron, and improvements in oxyacetylene rods, through application of foundry research, suggest that cast iron welding is not fixed and stabilized but that its development is just starting. Current specifications for cast iron rods for oxyacetylene welding permit a carbon range of 3.00-3.50, silicon 2.75-3.50 per cent, high silicon apparently being specified to promote machinability by using silicon as a controlling factor for graphitization. Tests with rods of 3.35 carbon, 2.20 silicon and 0.20 max. phosphorus lead to conclusion that lowering the silicon and phosphorus produces either a surface less susceptible to oxide film formation, or a surface from which films and inclusions can be readily removed by cleaning. Tensile strength of cast iron rods can be improved 75 per cent by reducing silicon and phosphorus content without adversely affecting hardness, machinability or fluidity. Effects of phosphorus, titanium, copper and other metals are described. It is concluded that electrodes can be made that will produce specific physical properties just as has been done in steel and alloy steel electrodes, and that practically any base iron can be used and its properties reproduced, modified or emphasized by adjusting the composition of the coating.

Casting

FILM IMPACT PROCESS. *"Film-Impact Process for Casting Metals,"* J. M. Merle, *Foundry Trade Journal,* vol. 68, No. 1364, Oct. 8, 1942, pp. 117-119. Review of article originally published in *Steel,* June 22, 1942, describing a process of casting ferrous and non-ferrous metals. In the process a molten metal stream from a ladle is formed continuously and instantaneously into a thin film of controlled thickness by a moving metallic section to which it at first adheres, losing heat rapidly by thermal conductivity until it loses its adhesion and is directed to impact into a mold under high velocity.

Conveyors

(See Materials Handling.)

Cupola

BALANCED BLAST. *(See Cast Iron.)*

(See Cast Iron.)

Dilatometer

(See Testing.)

Film Impact Casting

(See Casting.)

Fuel

CONSERVATION. *"Fuel Conservation in Foundries,"* Frank Hudson and A. E. McRae Smith, *The Metal Industry* (London), vol. 61, No. 18, October 30, 1942, pp. 274-276. From paper before Institute of British Foundrymen. Furnace thermal efficiencies are compared for various types of furnaces, including natural and forced draft coke-fired crucible, oil or gas-fired crucible, reverberatory, cupola, and small and large electric furnaces. Costs of operating various types of coke-fired furnaces are tabulated. Many coke-fired crucible furnaces suffer from lack of draft, and means of increasing the air supply are given. Common faults with oil-fired crucibles include burners or fans too small for complete combustion, burners out of alignment, and failure to make more use of exhaust gas analysis. Suggestions are given, some of which apply mainly to British practice, for greater efficiency in mold and core drying. In final analysis, a comparative record of fuel and power consumed should be kept so that wastage may be checked and remedied.

Magnesium

CORROSION *(See Non-Ferrous.)*

Magnesium and Aluminum

SCRAP RECOVERY. *(See Non-Ferrous.)*

Materials Handling

BUCKET CONVEYORS. *"The V-Bucket Elevator Conveyor,"* W. H. Atherton, *Mechanical Handling,* vol. 29, No. 11, November 1942, pp. 204-211. Description of a dual-purpose conveyor, acting on the vertical like a bucket elevator and on the horizontal like a scraper conveyor, discharging the load through doors or gates in upper trough. Buckets are rigidly attached to a pair of chains, the arrangement suitable for capacities up to 150 tons of coal per hour. Details are given on construction, wide variety of layouts possible, bucket capacities and weights, conveyor capacities and power, and comparative data given for various sizes.

Non-Ferrous

ALUMINUM ALLOYS *"Aluminum Casting Alloys—The Effect of Minor Alloying Elements,"* W. Bonsack, *The Metal Industry* (London), vol. 61, No. 21, November 20, 1942, pp. 327-329. Report of investigation carried out by National Smelting Co., presented to American Society for Testing Materials. Fourteen common elements in aluminum alloys are listed which may be desired alloying elements, innocuous, or harmful. Full use of remelted aluminum alloys is limited by existing specifications, the problem of alloying elements being stated as (1) What is an impurity and when is a minor alloying element an impurity; (2) what effect has this impurity on physical properties; and (3) what are the usable limits of this impurity. Discussion concerns sand cast, chill cast and die cast alloys only, casting alloys considered being those specified by A.S.T.M. This article, first of a series, deals mainly with 8 per cent copper alloy, and the effects of iron, magnesium, manganese, zinc, nickel, tin, lead and bismuth.

BRASS PROPERTIES. *"Bismuth—Its Effect on the Working Properties of Brass,"* Wm. B. Price and Ralph W. Bailey, *The Metal Industry* (London), vol. 61, No. 14, October 2, 1942, pp. 216-217. From Tech. Pub. No. 1441, American Inst. of Mining and Metallurgical Engineers. Tests are described on effectiveness of bismuth in increasing resistance of brass to dezincification. Data include corrosion and machinability tests, and analyses of alloys for cold rolling and hot forging, summarizing the observed effects of bismuth on Muntz metal, alpha-beta brasses, cold rolling and annealing, hot-working properties, ductility.

MAGNESIUM CORROSION. *"The Corrosion of Magnesium and Magnesium-Base Alloys,"* C. J. Bushrod, *The Metal Industry* (London), vol. 61, No. 21, November 20, 1942, pp. 324-326. While great advances have been made in developing corrosion-resistant magnesium-base alloys, and of protective treatments for them, there still is room for improvement. It is not yet possible fully to protect magnesium alloys from sea water attack, and alloys with higher corrosion-resistant properties and better surface-protection treatments probably will be introduced in the next few years. The effect of alloying elements on the corrosion rate of magnesium is described and tabulated. Atmospheric, acid and salt solution corrosion is discussed. Two types of protective treatment are covered, and the prevention of corrosion for several special purpose alloys, of particular war interest, are discussed.

PERMANENT MOLD CASTINGS. *"Aluminum Permanent Mold Castings,"* E. G. Fahlman and Herbert Chase, *Iron Age,* vol. 149, No. 17, April 23, 1942, pp. 36-42. Review of current practice of large producer of aluminum castings in permanent molds, including descriptions of some unusual castings for aircraft and mobile ordnance units. A dozen or more aluminum alloys are suitable for permanent and semi-permanent mold castings, those most used by the plant being: (1) 5% Si alloy, containing silicon and aluminum only; (2) No. 12 alloy, containing about 8% Cu, 2% Zn; (3) heat-treatable 4.5% Cu, 2.5% Si alloy, with Fe max. 1.1%, remainder Al; (4) heat-treatable 5% Si alloy, 1.3% Cu, about 0.5% Mg, remainder Al; (5) heat-treatable 7% Si alloy, about 0.4% Mg, remainder Al. All are cast at 1450° F. or lower, depending on casting and mold design, and all pouring is by gravity. Small molds usually are single gated; large molds with up to 4 gates, all poured simultaneously from separate ladles. After a casting is removed, mold is blown out and cooled by an airblast containing a water spray.

SCRAP RECOVERY. *"German Recovery of Light Metal Scrap," Iron Age,* vol. 149, No. 23, June 4, 1942, pp. 54-58. Methods of converting scrap aluminum turnings and chips into high grade usable metals, and the recovery program for aluminum and magnesium alloy scrap carried out in two German piston manufacturing plants are described. Key to German use of light metal scrap lies in precise laboratory supervision and care in handling and processing, to produce recovered metal equal to virgin metal. One of the main reasons for conserving light metal scrap has been recovery of alloying elements. In manufacture of pistons, care is taken to avoid loss of even most minute chip, machines being equipped with catchers and operators held responsible for clear separation and collection of all turnings

according to composition. Departments working with ferrous materials are separated from rest of plant, and iron content of alloys recovered frequently is less than 0.4 per cent. Laboratory supervision embraces entire raw material and metal cycle from the time material enters the plant. Physical qualities of raw materials and finished products closely controlled, through test stations staggered through the plant keeping close watch on product in various forms of manufacture, and resulting waste. Foundry slag is sold to smelters for metal recovery, who classify it and return to the plant. Used and discarded pistons are not sold to scrap dealers but returned to the works in which they were made, thus making full use of the metal and alloying elements, and maintaining continuous control of product. Aluminum recovery involves a chip breaker, centrifuge for disposing of oil and moisture, drying drum furnace, magnetic separator, charging machine, and melting furnace, all inter connected by materials handling equipment. Fine turnings and chips are melted under a salt blanket to avoid burning. The slag cake is broken and ground, aluminum oxide and some of the salt being recovered. Continuous metallurgical supervision of the entire process is maintained.

Open Hearth Furnace

LININGS. *(See Steel.)*

REFRACTORIES. *(See Steel.)*

Pyrometers

(See Testing.)

Refractories

OPEN HEARTH STEEL. *(See Steel.)*

SELECTION. *"Selection of Refractory Bricks, Shapes and Blocks,"* R. G. Lapley, *The Refractories Journal,* No. 10, October 1942, pp. 261-263, 265. From paper in *Clay Products Journal of Australia,* Sydney. Selection of a refractory is governed by the degree of heat treatment that the materials must meet. Specifications must be based on standard test methods, specification tests of American Society for Testing Materials and the Institution of Gas Engineers being generally recognized. Points to assist in selecting proper refractory for a particular installation are given as: (1) Maximum operating temperature attained, and whether fluctuating or soaking conditions prevail; (2) continuous or intermittent furnace operation; (3) abrasion conditions; (4) oxidizing or reducing furnace atmosphere conditions; (5) nature of slags encountered; (6) load bearing conditions at elevated temperatures; (7) type of fuel used and how fired.

Scrap Recovery

ALUMINUM AND MAGNESIUM. *(See Non-Ferrous.)*

Steel

ALLOY. *"Heat Resisting Alloys,"* T. G. Beament, *Canadian Metals and Metallurgical Industries,* vol. 5, No. 10, October 1942, pp. 292-295. Paper presented before Ontario Chapter, American Society of Metals. Outlining a practical analysis of various factors in heat resisting alloys that must be considered when designing any contemplated industrial high temperature assemblies. In discussing the utility of an alloy for a given service, data are given on surface stability and physical strength at high temperatures, and alloys are roughly grouped as: (1) Chromium iron plus minor constituents, (2) chromium nickel plus minor constituents, and (3) chromium nickel iron, ternary series. In the third group, data are given for alloys of Cr 20-30% Ni 5-15%, Cr 15-21% Ni 30-40%, Cr 12-21% Ni 50-65%, and Cr 16-25% Ni 5-10%. Effects of carbon, manganese, silicon, aluminum on heat resistance are given. The importance of designing individual alloy castings to avoid rapid sectional changes is stressed. Stresses set up by temperature fluctuations cause more failures in the general run of high temperature installations than all other causes combined. As a general rule, sand castings are somewhat stronger than wrought forms in the high nickel alloys, and in all cases seem to resist distortion to a greater degree.

BOMBS. *"Casting 500-lb. Aerial Bombs," Iron Age,* vol. 149, No. 23, June 4, 1942, pp. 59-61. Method of casting 500-lb. aerial bombs in British foundry, previously described in *Foundry Trade Journal,* and abstracted in *American Foundry,* August 1942.

CHEMICAL ANALYSIS. *"Short Cuts for Determining Sulphur and Molybdenum in Alloy Steels,"* E. R. Vance, *Steel,* vol 111, No. 6, August 19, 1942, pp. 98, 100. Methods used for several years for determination of sulphur and molybdenum are described, giving an accurate check on results obtained by standard gravimetric procedures, and consuming less time. The combustion-oxidation method for determining sulphur employs a combustion furnace and titration assembly, results being obtained within two minutes after the steel has been weighed. A new procedure was developed for determination of molybdenum, with complete determination obtained in 10-12 minutes, at comparatively low cost. Solutions and procedures are detailed for both the sulphur and the molybdenum determination methods.

GUN AND ARMOR. *"Producing Gun and Armor Steel,"* D. O. Davis, *Canadian Metals and Metallurgical Industries,* vol. 5, No. 11, November 1942, pp. 322-327. Paper presented at meeting of Montreal chapter, American Society of Metals, describing operations at plant of Dominion Foundries & Steel, Ltd., Canada, in producing armament steels. Many large and small armor steel castings are made, including turrets and large nose castings for tanks, in addition to large scale operations in gun shop forging, hot and cold mill, hot strip, universal and armor plate, and bullet proof steel. The steel foundry produces castings to wide range of metallurgical and physical specifications, from cutter knives weighing 3 ounces to mill housings of 70 tons. Range of analysis varies from ordinary 0.2 to 0.25 carbon to a heat resisting alloy. The breech block for a 4 in. naval gun, formerly a forging, now is supplied as a steel casting.

MOLD STOOLS. *"Insert Triples Life of Mold Stools," Steel,* vol. 110, No. 18, May 4, 1942, pp. 82, 85, 110. The simplest form of an ingot mold is essentially a hollow cast-iron sleeve resting on a cast-iron stool. By providing a separate cast-iron insert supported by a steel frame, temperature differences and stresses are greatly reduced and the stools remain in service longer than those cast in one piece. Breakage when loosening stool stickers is entirely eliminated, and easy replacement of worn inserts results in saving cast iron and labor, and releases foundry capacity for other vital uses. Several ingots can be poured on one stool by providing a separate insert for each ingot. Records of one plant indicate, for 12-month period using regular slab stools, consumption of 11.8 lbs. of stools per ton of ingots; for 10 insert stools in 4-month period, ¾ lb. of insert per ton of ingots.

OPEN HEARTH LININGS. *"The Linings of Large Basic Open-Hearth Tilting Furnaces,"* A. Jackson, *"The Refractories Journal,* No. 9, Sept. 1942, pp. 207, 209-212, 215-216. From paper presented at Autumn meeting, *Iron and Steel Institute* (London). Author first deals with the problem of the linings of large basic open-hearth tilting furnaces from standpoint of lining stability when the furnace is tilted, particularly with regard to lining on the charging side. Two types of operation and resultant methods of fettling are outlined. Causes of excessive hearth wear are enumerated, and resultant effects on brickwork of the hearth and linings are described. Materials now being used for brickwork of the furnace body and for lining maintenance are discussed. Future prospects are reviewed, with brief summary given in an appendix of brick consumption on two modern furnaces from which over half a million tons of ingots were cast.

Testing

DILATOMETER. *"A Recording Dilatometer for Metal Specimens,"* L. R. Stanton, *Iron and Steel Institute* (London), Advance Copy, Dec. 1942, 7 pp. A dilatometer is described which produces a permanent record of the length changes of a metal specimen, with accuracy of 0 to .001 mm. The range over which measurement can be made extends to about 0 to .2 mm., the sensitivity being adjusted to suit any particular requirement. The measuring principle involves the tuning of an inductance about its resonant point by means of a small condenser actuated by the dilatometer, and particular care is taken to insure stability of the apparatus over long periods.

MICROSCOPIC. *"Micro and Macro Structures of Gray Iron and Meehanite,"* Chas. R. Austin and M. M. Lipnick, *Iron Age,* vol. 149, No. 19, May 7, 1942, pp. 72-74; vol. 149, No. 20, May 14, pp. 58-61, 129-130. A simple grinding and polishing technique is described, developed to obtain true micro and macro structural characteristics of gray irons in unetched and etched condition. Importance of plate developing solutions is demonstrated by means of comparative micrographs. Data are given on use of the technique in studying graphite flakes and other structural details of irons. Detailed results are given for studies on changes in macrostructural appearance of Meehanite, in an effort to ascertain the reason for profound effect of pouring temperature on tensile strength.

PYROMETERS. *"The Calibration of the Platinum 13%-Rhodium Platinum Thermocouple over the Liquid Steel Temperature Range,"* C. R. Barber, *Iron and Steel Institute* (London), Advance Copy, Dec. 1942, 9 pp. The e.m.f.'s of eight platinum/13%-rhodium-platinum thermocouples have been measured at the melting point of gold, palladium and platinum by the wire method. On the basis of these determinations and the existing e.m.f./temperature relation up to 1550° C., a reference table for the platinum/13%-rhodium-platinum thermocouple covering the range 1400 to 1770° C. has been computed. It

is estimated that the accuracy of the calibration in terms of the international temperature scale is ± 3° C. up to 1600° C. and ± 5° C. beyond this particular temperature.

REFRACTORIES. *"Apparatus for Measuring Thermal Conductivity of Refractories,"* C. L. Norton, Jr., *Journal of American Ceramic Society,* vol. 25, No. 15, November 1, 1942, pp. 451-459. Paper presented at 1942 annual meeting American Ceramic Society. An apparatus for measuring the thermal conductivity of refractories is described in detail, and results are shown for several types of insulating refractories. Comparisons are made from data which were obtained on a low-temperature plate tester, and the effect of several variables on measured heat flow are discussed.

SPALLING TEST. *"Development of the Panel Spalling Test,"* Earl C. Petrie, *The Refractories Journal,* No. 10, October 1942, pp. 249, 251, 253-255. Paper presented at meeting of Ohio Ceramics Industries Association. Water dip tests on spalling resistance of refractories are misleading, as they do not predict behavior of many types of bricks in furnaces where spalling conditions are severe. Research involved in developing a better test is described, and details given on the panel test adoped as standard by American Society for Testing Materials in 1936. In this test panels are placed on either side of a pre-heating furnace, joints between being sealed with plastic kaolin. Preheating temperature is reached in not less than 5 hours nor more than 8 hours, panels then cooling to room temperature before spalling is started. Spalling treatment consists of 12 cycles for each panel, being heated to 1400° C. in not over 3 hours. Cooling is by means of an air water-mist blast. Spalls are removed by hand, no satisfactory mechanical means having been found. Final spalling results depend considerably on proper insulation for backing up the panels during the preheat.

Welding

CAST IRON. *(See Cast Iron.)*

March Chapter Meeting Schedule

March 1

Central Indiana
Washington Hotel, Indianapolis
HOWARD J. ROWE
Aluminum Co. of America
"Aluminm Alloy Castings"

✦

Chicago
Chicago Bar Assn. Restaurant
ROUND-TABLE MEETINGS
Steel—Salvage and Substitutes
Gray Iron—Core Materials, Equipment
Malleable—Sand Control Practice
Non-Ferrous—Melting Practice
Pattern—Substitution of Metal Parts

✦

Metropolitan
Essex House, Newark, N. J.
ALEXANDER GOBUS
Lucius Pitkin, Inc.
H. R. ISENBURGER
St. John X-Ray Service, Inc.
"Practical Use of X-Ray and Gamma-Ray Inspection of Castings"

✦ ✦

March 2

Michiana
La Salle Hotel, South Bend, Ind.
F. W. BROOKE
Swindell-Dressler Corp.
"Electric Furnaces"

✦ ✦

March 3

Chicago
Peoples Gas Bldg. Auditorium
FOUNDRY LECTURE COURSE
Lecture No. 3—Steel

✦ ✦

March 5

Chesapeake
Engineers Club, Baltimore

✦

Western New York
Hotel Touraine, Buffalo
THOMAS BARLOW
Vanadium Corp. of America
"Alloy Inoculations"

✦ ✦

March 8

Cincinnati
Cincinnati Club
H. G. LAMKER
Wright Aeronautical Corp.
"Magnesium and Aluminum"

✦ ✦

Western Michigan
Ferry Hotel, Grand Haven
THOMAS BARLOW
Vanadium Corp. of America

March 9

Northern Illinois-Southern Wisconsin
Hotel Hilton, Beloit, Wis.
H. W. DIETERT
Harry W. Dietert Co.
"Behavior of Foundry Sands and Cores at Elevated Temperatures"

✦ ✦

March 10

New England Foundrymen's Assn.
Engineers Club, Boston
R. G. ROBINSON
Werner G. Smith Co.
"Variables in the Baking of Cores"

✦ ✦

March 11

Northeastern Ohio
Cleveland Club, Cleveland
A. W. GREGG
Whiting Corporation
"The Cupola's Place in Steel Castings Production"

✦

St. Louis District
De Soto Hotel, St. Louis

✦ ✦

March 12

Central New York
Onondaga Hotel, Syracuse

✦

Philadelphia
Engineers Club
JOHN L. LOWE
Battelle Memorial Institute
"Control of Quality of Cast Iron"

✦

Northern California

✦

Toledo
Hillcrest Hotel
ROUND-TABLE MEETINGS

✦ ✦

March 15

Quad City
Blackhawk Hotel, Davenport, Iowa
"Cupola Practice"

✦ ✦

March 17

Chicago
Peoples Gas Bldg. Auditorium
FOUNDRY LECTURE COURSE
Lecture No. 4—Non-Ferrous

✦ ✦

March 18

Detroit
Rackham Educational Memorial
ROUND-TABLE MEETINGS
Gray Iron, Malleable Iron, Magnesium, Brass and Bronze

March 18

Eastern Canada-Newfoundland
Mt. Royal Hotel, Montreal

✦ ✦

March 19

Birmingham District
Tutwiler Hotel, Birmingham

✦

Wisconsin
Hotel Schroeder, Milwaukee

✦ ✦

March 22

Twin City
Coffman Memorial Union, University of Minnesota
(1) PAT DWYER
"The Foundry"
"Gates and Risers"
(2) ROUND-TABLE MEETINGS
Steel—Cast Iron—Non-Ferrous—Pattern

✦ ✦

March 26

Ontario
Royal Connaught Hotel, Hamilton, Ont.

✦ ✦

March 31

Chicago
Peoples Gas Bldg. Auditorium
FOUNDRY LECTURE COURSE
Lecture No. 5—Refractories

✦ ✦

APRIL MEETINGS

April 2

Western New York
Hotel Touraine, Buffalo

✦ ✦

April 5

Chicago
Museum of Science and Industry
INSPECTION TOUR
Maj. Lenox R. Lohr, President of the Museum

✦

Metropolitan
Essex House, Newark, N. J.

✦

Western Michigan
Ferry Hotel, Grand Haven

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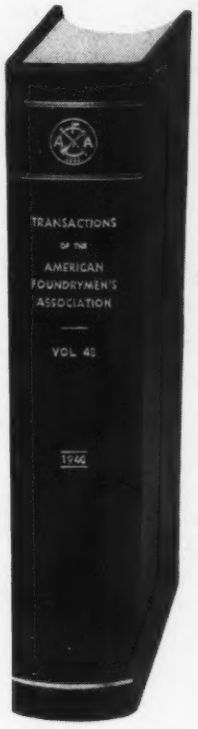

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